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AMERICAN
DYESTUFF REPORTER

DEVOTED TO TEXTILE WET-PROCESSING

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KNITTING ARTS EXHIBITION NUMBER

AMERICAN

DYESTUFF REPORTER

Volume 46 APRIL 22, 1957 Number 8

"Automation for Increased Profits"———

43rd KNITTING ARTS EXHIBITION

THE 1957 Knitting Arts Exhibition—the 43rd in a continuous series of successful trade shows devoted exclusively to the knitting industry in all its branches—will open at noon, Monday, April 29 and run through Friday, May 3, in the Atlantic City, N J, Auditorium.

Sponsored jointly by the National Association of Hosiery Manufacturers, the National Knitted Outerwear Association, and The Underwear Institute, the 43rd Knitting Arts Exhibition will have as its theme "Automation for Increased Profits".

More than 220 exhibitors have contracted for space at the biennial show, which will feature the latest type equipment, accessories, finished products and services. KAE officials confidently expect the '57 attendance figure to top the 9500 figure set at the '55 show.

Of special interest to the textile wet-finishing trade will be those exhibits devoted to dyeing and finishing equipment, chemicals, dyes, finishes, oils, soaps, and testing equipment, as well as those displays of general interest, such as handling and maintenance, power, and atmospheric conditioning equipment.

On succeeding pages will be found descriptions of exhibits which, it is felt, will be of chief interest to readers of AMERICAN DYESTUFF REPORTER.

There is no admission charge in connection with the show. Registration is open to all connected with the industry.

Those planning to attend the 43rd "KAE" are cordially invited to visit Booths 211-212, where AMERICAN DYESTUFF REPORTER personnel will be in attendance.

Show Hours

MONDAY, APRIL 29	12 NOON	to	6 PM
TUESDAY, APRIL 30	12 NOON	to	10 PM
WEDNESDAY, MAY 1	10 AM	to	6 PM
THURSDAY, MAY 2	10 AM	to	6 PM
FRIDAY, MAY 3	10 AM	to	1 PM

Atlantic City Auditorium during 42nd Knitting Arts Exhibition

EXHIBIT PLAN

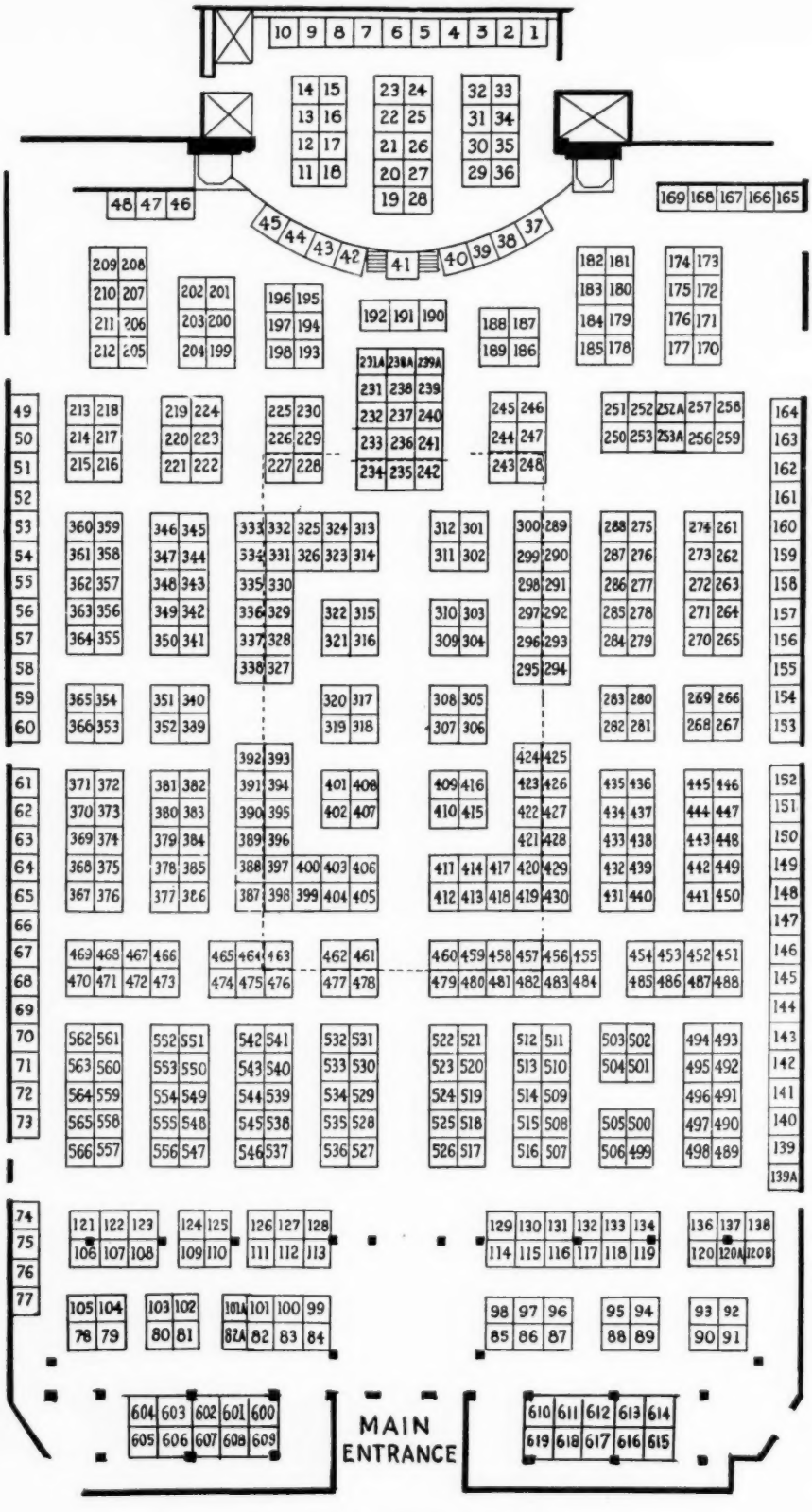


EXHIBIT DESCRIPTIONS

AMERICAN ANILINE & EXTRACT CO, INC

Venango & F Sts, Philadelphia 34, Pa
Space 390

In attendance—William J Duddy, president; Martin H Silberman, technical director; Lynn Kippax, sales manager; and William A Moran and James H Jones, sales representatives.

AMERICAN DYESTUFF REPORTER

44 East 23rd Street, New York 10, N Y
Spaces 211-212

On display—Official publication of the Proceedings of the American Association of Textile Chemists and Colorists.

In attendance—Norman A Johnson, Myron D Reeser, Herbert A Stauderman, Charles A Whitehead, James A Doyle and Ernest J Finan.

AMERICAN ENKA CORP

206 Madison Ave, New York, N Y
Spaces 163-164

On display—Enka rayon, Enka nylon, Enka Jetspun solution-dyed rayon, Enka high tenacity and regular rayon.

In attendance—Kenneth N Bacon, advertising and promotion manager; M Boylan Carr, manager, textile sales department; Claude L Hayden, assistant manager, textile sales department; D C Smith, Textile sales department; A B Harris, manager, nylon sales department; R L Peacock, assistant manager, nylon sales department; T R Thayer, manager, industrial sales department.

AMERICAN VISCOSE CORP

350 Fifth Ave, New York 1, N Y
Spaces 409-410-415-416

On display—Filatex yarns, Colorspun yarn and staple, and new knitted fabrics.

In attendance—T H Andrews, Daniel A Davis, John C Folsom, Walter Hadfield, Walter Hauer, Frank F Hilson, John H Kemp, Herbert C Simpson, Frank Soling, William S Sollenberger, Leslie L Walmsley, Irvin Welch, Robert Werntz and Jackson A Woodruff.

BANNER YARN DYEING CORP

488 Morgan Ave, Brooklyn, N Y
Space 261

On display—Hi-bulk and Turbo skein-dyed Orlon; Bannerized wool sweaters and knitted suits, Helanca yarn type SW by Banner Piece Dyeing Corp, Ban-Lon sweaters by Banner Piece Dyeing Corp.

In attendance—Murray G Catin, Dan Levy and Jack Weinberg.

BURLINGTON ENGINEERING CO, INC

Graham, N C
Spaces 17-18

CELANESE CORP OF AMERICA

180 Madison Ave, New York 16, N Y
Spaces 214-215-216-217

On display—Variety of knitted fabrics and garments made from knitted fabrics.

In attendance—George Hein, N Y district sales manager; Edward Engel, assistant merchandise manager, knit fabrics; William O'Neil, salesman for Pennsylvania district; and Hamilton Macauley and Bernard Kearney, salesmen, N Y office.

THE CHEMSTRAND CORP

350 Fifth Ave, New York 1, N Y
Spaces 66-67-68

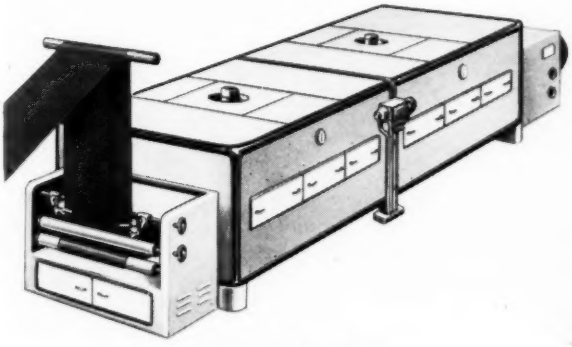
On display—Chemstrand Corp's Acrilan acrylic fiber and Chemstrand nylon yarns.

In attendance—E A O'Neal, Jr, president; W G Luttge, vice president; M H Morse, nylon sales manager; R E Smith, Acrilan sales manager; B F Bertland, director of advertising, merchandising and promotion; C W Carvin, jr, assistant nylon sales manager; D W Bedell, assistant Acrilan sales manager; and C W Gayler, director of technical sales.

COSA CORP

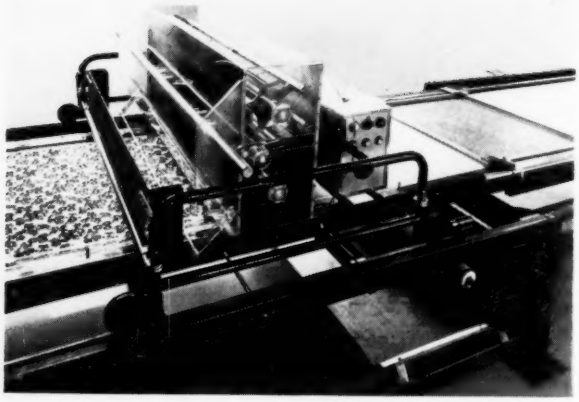
405 Lexington Ave, New York 17, N Y
Space 500

On display—Mahlo Textometer, which automatically controls the moisture content of fabrics and warps emerging from dryers and slashers; lay-on-air dryer: a unique, aerodynamic construction of the Vits single pass, forced convection "lay-on-air" system, which is said to provide maximum possible efficiency in the high-speed drying of all fabrics and is also said to be



Vits lay-on-air dryer

Scholl skein dyer



Saladin Flock Beamer FO-2

excellent for curing, heat-setting, polymerization, and direct dyeing in one pass, and other finishing processes; Vits drying tenter: said to permit higher speeds and complete uniformity in the drying, finishing, curing, polymerizing and direct dyeing of all textile fabrics; overfeeding heads, which can be used as an accessory to any tenter and are separately driven and manually controlled by a friction clutch; Scholl skein dyeing machine: the yarn carrier acts as a cover permitting high temperatures, high pressures and complete penetration of the dye liquor into the yarn, resulting in completely uniform color impregnation; Vollenweider HPI shearing machine, especially designed to shear knitted pile fabrics; Projectina optical analyzer, which is said to permit fast, convenient measuring, counting and comparing of yarns, fabrics or fibers; Saladin flock printing machine: the electro-static flocking and electro-static flock recovery in the Saladin Flock Beamer FO-2 are said to result in an upright pile of uniform density providing clear contours and excellent definition of design.

In attendance—Gilbert Luy, Klaus Bahlo and Leonard Platnick.

CUMMINGS LANDAU LAUNDRY MACHINERY CO, INC

305 Ten Eyck St, Brooklyn 6, N Y
Spaces 107-108

On display—Knitwear washing unit extractor; reversing type steam-heated drying tumbler.

In attendance—David Green and Eugene Cummings.

CUTTING ROOM APPLIANCES CORP

1134 Broadway, New York 10, N Y
Spaces 492-493-494-495

On display—Electromatic cloth spreader; electric knit-goods laying-up machine; Clip-matic thread trimmer in stationary, portable and dual-purpose models; metal sectional cutting table and the new cloth-spreading machine.

In attendance—David Grossberg, Al Greene, Sol Lerner, Bert Gottschalk, Abner I Gilber, John Pransky, Harold Liebman, John E Fox, Sidney L Hirsch and Bernard Nathanson.

W F FANCOURT CO

516 S Delaware Ave, Philadelphia 47, Pa
Spaces 515-516

On display—Vibralon finishes, Vibratol, Lanaseal, Nyaseal, Reslon, Scourlon, Pentalon, Fantascour and Fancosol.

In attendance—John Fancourt, Thomas Lindley, Robert Rhodes, Willard Sawyer and Claude G Wolff.

FLETCHER WORKS, INC

Glenwood Ave and 2nd St, Philadelphia 40, Pa
Spaces 191-192

On display—Fletcher Works' latest developments in throwing machinery and centrifugal extractors, including the Fletcher 30″ Junior Extractor made with stainless-steel curb.

In attendance—Edward T Taws, president; T B Baldridge, Jr, mgr, Throwing Div; H J Roessel, Sr, and H J Roessel, Jr of the Throwing Div; Frederick S Claghorn, sales mgr, extractors; Harry B Allison, chief engr, extractors; and F W Warrington, Southern representative.

FRANKLIN PROCESS CO

564 Eddy St, Providence, R I
Spaces 444-445

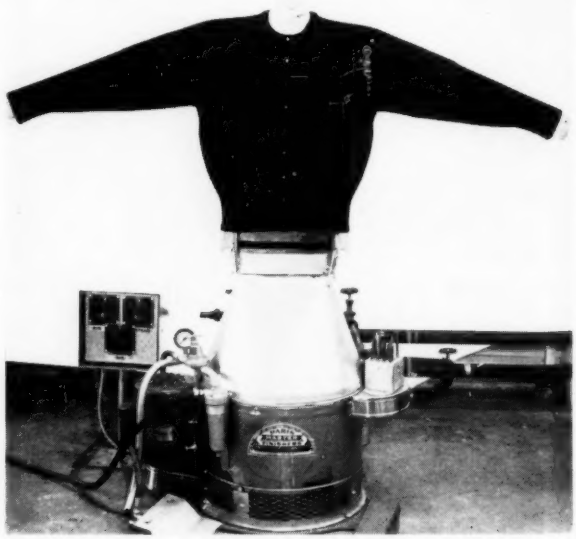
On display—package-dyed yarn on the Franklin Process compressible spring (cotton, Orlon, Helanca nylon, rayon, Dacron); package-dyed Hi-bulk Orlon and dyed Orlon tow.

In attendance—Providence plant: W Wolfe, president; C W Dawson, manager; H N Graves, sales manager; R B Lusignea, sales analyst; I W Gardner and R S Allen, representatives. Philadelphia plant: M E Davis, manager; C E McElwee and L Grindrod, representatives. New York office: S W Cable, manager; A G Dana, representative. Chattanooga plant: R F Strahley, manager; H O Fry, sales manager; R C McCarthy and D M Robinson, representatives. Greenville plant: B S Phetteplace, manager; J R Garner and E T Wrenn, representatives.

GARMENT FINISHING EQUIPMENT CORP

18 Braitle St, Cambridge 38, Mass
Spaces 133-134

On display—The new Paris Sweater Finisher will be shown in operation for the first time. It is stated that precision pressing of all sweaters, regardless of fiber, style, or size, is done automatically by these steam-air finishers. Placed upright over the machine's moving parts (pre-set to the wanted dimensions) the sweater is



Paris sweater finisher

moistened with steam and then dried with heated air. Nothing touches the outside of the sweater. The result is claimed to be a hand and quality of finish, uniformly and automatically imparted, that is impossible with conventional pressing.

In attendance—Felix Renick, president; Richard S Dickie, Jr and Kenneth G Dunn.

HENRICI LAUNDRY MACHINERY CO

10 Henrici St, Mattapan 20, Mass
Space 41

GEIGY DYESTUFFS
Division of Geigy Chemical Corp

Saw Mill River Road, Ardsley, N Y
Space 165

On display—Mitin durable mothproofing.

In attendance—Walter E Bill

GLOBE DYE WORKS CO

4500 Worth St, Philadelphia 24, Pa
Spaces 377-378

On display—Package-dyed cotton, worsted, zephyr and synthetic blend yarns; package-dyed Turbo and Hi-bulk Orlon and Acrilan.

In attendance—H T Greenwood, president; Thomas S Greenwood, sales manager; Fred V Traut, superintendent of processing; William A Hilbert, William B Taylor and Richard W Foltz, sales representatives.

ALFRED HOFMANN & CO

635 59th St, W New York, N J
Spaces 341-342-349-350

On display—The Projectina, an optical testing instrument for research and quality control of fabrics and yarns (microscopy, projection, instantaneous photographic recording); working model of tentering frame with new combination pin/clip chain; fabric guiders; mechanical and photoelectric selvage feelers; electromagnetic feeding device for tentering frams; selvage uncurlers.

In attendance—C A Hepp, president; P Schoenster, vice president; H Peter and A A Brenner, sales department.

INDIAN ORCHARD FINISHING CO

Indian Orchard, Mass
Space 116

On display—Dyeing and finishing of knitted fabrics in Orlon, Acrilan, blends, wool, cotton, etc.

In attendance—Larry Wess, Charles Brennan and Charles Weeks.

INTERNATIONAL SILK ASSOCIATION (USA)

489 Fifth Ave, New York, N Y
Space 348

On display—Knitted fabrics and garments made of silk and combinations of silk with other fibers.

In attendance—Siegfried F Brand.

KEYSTONE DYEING CO, INC

3215 Amber St, Philadelphia 34, Pa
Space 504

On display—Dyeing and finishing synthetic knitted piece goods and sweaters.

In attendance—Frank P Murphy and Henry Kline.

KLAUDER-WELDON-GILES MACHINE CO

Adams Ave and Leiper St, Philadelphia, Pa
Space 54

LAUREL SOAP MFG CO, INC

Tioga, Thompson and Almond Sts, Philadelphia, Pa
Spaces 547-548

On display—Lubricating and conditioning emulsions and winder trough solutions for cotton, rayon, wool, nylon, Orlon and blends; coning oils for treating synthetic yarns, particularly the textured yarns such as Banlon and Helanca, and novelty yarns and acetate; sizes for hosiery yarns; hosiery boil-off compounds; sweater scouring compounds; softeners and finishes; a complete line of package dyeing assistants and finishes.

In attendance—Clarence E Bertolet, president; William H Bertolet, Jr, treasurer; A Henry Gaede, Fowler Jackson, William H Bertolet, 3rd, Thomas C Holst, B N Peterson, J Paul McGinty and Albert H Rant.

LEATEX CHEMICAL CO

2722 N Hancock St, Philadelphia, Pa
Spaces 3-4

On display—Chemical specialties for textile processing.

In attendance—M M Guertin, L K McChesney, J A Clark, T F Robbins, W J Brink, H Buckley, H Higginbotham, J McChesney, Jr, S J Guertin, C L Hammell, J F Rieder, and J McChesney, Sr.

LINDLY & CO, INC

248 Herricks Rd, Mineola, N Y
Space 50

On display—Lindly automatic yarn inspector; Lindly automatic photo scanner.

In attendance—Vincent E Lynch, Thomas J Fox and Charles P Elgin.

PARAMOUNT TEXTILE MACHINERY CO

131 S Wabash Ave, Chicago 3, Ill
Spaces 313-314-323-324-325-326

On display—Convamatic boarding machine; stainless steel and aluminum boarding and preboarding forms.

In attendance—Henry Pope, Jr, William Pope, J C Fenley, G R Scheuring, H N Campbell, W Brown, W H Albertson, L J Albertson, O A Siegel, L D Ross, W E Pike and Frances Snogren.

JOSEPH PERNICK CO, INC

54-19 Flushing Ave, Maspeth 78, N Y
Spaces 336-337

On display—The Aero-Dyne dryer, a new process for drying tubular knit goods of all fibers, for wool jersey, Orlon, nylon and cotton; measuring and examining machine; knit goods calendar for finishing all types of tubular knit goods.

In attendance—L Pernick, D Pernick, D Haft and M Pernick.

PHILADELPHIA METAL DRYING FORM, INC

Philadelphia 24, Pa
Space 374

On display—Hosiery boarding equipment (steam and electric forms).

In attendance—T P Flanagan, A H Johnson and B B Johnson.

PROCTOR & SCHWARTZ, INC

7th St and Tabor Rd, Philadelphia 20, Pa
Spaces 557-558-565-566

On display—The Proctor continuous bleach range; the Proctor loop dryer; the Proctor Electrocolorset; the Redman process.

In attendance—W H Poole, D D Cunningham, C W Allen, A Bickel and F Redman.

(*Additional exhibit descriptions on page 277*)

PRELIMINARY INVESTIGATION OF STRETCH-TYPE NYLON MILITARY HOSIERY*

JOHN ZIMMERMAN
Fabric Engineering Section
Textile Engineering Laboratory Branch,
Textile Clothing & Footwear Division
Quartermaster Research & Development Center
U S Army
Natick, Mass

and

CLARENCE J POPE
Lowell Technological Institute
Lowell, Mass

The use of stretch-type nylon yarns in combination with nonstretch cotton and/or wool yarns was investigated to provide a basis for a reduction in the number of sock sizes procured by the Army.

It was found that either the plating or plying system of combining stretch nylon with nonstretch yarns was satisfactory for use in military hosiery. The torque type of stretch nylon yarns provided greater elongation than did the nontorque types.

The elongation of stretch-type socks is practically unaffected by laundering and the resistance to dimensional change resulting from laundering is somewhat greater in the stretch-type socks than in the standard, nonstretch military socks. To insure opfimum performance of stretch-type cushion-sole socks, the wool used in the construction of this sock should be shrink-resistant treated in stock, top or yarn form.

I INTRODUCTION

THE development of stretch-type synthetic yarns represents a unique advance in the textile industry. Such yarns may be incorporated into various types of wearing apparel to substantially reduce the number of sizes that are normally procured. Along with fewer sizes, the use of stretch-type yarns may provide: 1) better fit, 2) greater durability to wear, and 3) greater and more uniform dimensional stability to laundering.

While stretch-type nylon yarns may be incorporated into many types of end items, military as well as industrial attention has been focused primarily on the use of these yarns in men's hosiery. Since numerous stretch-type nylon yarns are commercially available and various yarn systems may be employed in combining stretch and nonstretch elements in the knitting of men's hosiery, a preliminary investigation was undertaken to determine the physical characteristics imparted to the Army rib dress and cushion-sole socks by the use of these yarns. This report deals principally with the evaluation of the elongation, recovery and shrinkage properties of stretch-type socks. It should be pointed out that the data reported herein pertain to the laboratory analysis of stretch-type socks knitted and finished by *a single hosiery manufacturer.*

II BACKGROUND

The stretch-type nylon yarns used today in the knitting of hosiery or stretch-type fabrics may be divided into two basic groups: torque and nontorque yarns. This division follows differences in the manufacturing technology used to produce such yarns for identical end uses. Torque stretch yarns are produced by using the "twist-heat set-untwist principle." Nontorque stretch yarns are obtained by introducing a permanently coiled or crimp effect in the yarns by nontwist mechanical techniques (ie, drawing yarns over a heated blade or forcing yarns into a heated stuffing box).

With the development of these yarns, hosiery consisting of 100 percent stretch-type nylon yarns, in a single foot size, appeared on the civilian market and was received with general public approval. The Army Quartermaster Research & Development Command followed the development of stretch type yarns with keen interest and began preliminary laboratory investigations. The data obtained after repeated laboratory testing of the only two stretch-type nylon yarns then available indicated that these yarns showed promise for use in military hosiery. Accordingly, rib dress socks knitted with 100 percent stretch nylon yarns (torque and nontorque- and in 3 foot sizes (small medium and large) were developed and field tested at Fort Lee, Virginia in June 1953. The two experimental stretch socks were compared with the standard Sock, Men's Cotton, Rib (9 sizes). The subjective aspects of the field testing phase embodied evaluations for comfort, fit, and sock preference; the objective phase evaluated dimensional stability to laundering, durability to wear, adequacy of the 3-size system and range of foot dimensions fitted by each sock size.

Upon completion of the field test, the final report [1] stated the following:

1) The experimental stretch socks were equally as comfortable as the standard item.
2) The experimental stretch socks exhibited significantly greater dimensional stability to laundering and significantly longer service life than the standard cotton rib sock. Wear life expectancy data revealed the experimental items would outlast the standard cotton sock by an average ratio of 1.7 to 1.
3) The 3-size system in the elasticized nylon sock provided as good a fit as that provided by the 9-size system of cotton socks.
4) Satisfactory fit of socks was obtained by using the medium-size (elasticized) sock on foot sizes ranging from 9 through 13, inclusive.

Despite the favorable field test data, some concern was felt regarding physiological effects that might be experienced in some individuals as a result of nylon being worn next to the skin under continuous wear and rugged military usage. Fortunately, stretch-type yarns may be used in combination with other yarns spun from natural fibers, also different manufacturing techniques may be employed for producing socks in which little nylon will contact the skin, thus minimizing undesirable physiological effects. The following yarn and sock manufacturing systems were investigated to determine which possessed the greatest advantages for use in military hosiery:

1) Plating (ie, knitting a stretch and nonstretch yarn together in such a manner that the stretch nylon yarn appears on the face of the sock and the nonstretch yarn is next to the skin.
2) Plying (ie, twisting together a stretch-type yarn with a wool or cotton yarn; the plied yarn is then knitted as a single entity).
3) Core-spinning (ie, using stretch-type yarn as a core with a cotton or wool "wrap-around").

The above-described systems, using various torque and nontorque nylon

*Textile Series Report No. 94, Textile, Clothing & Footwear Division Headquarters Quartermaster Research and Development Command, Quartermaster Research & Development Center, U S Army, Natick, Mass.

[1] QMBT 53065 Socks Men's Rib Nylon (Elasticized), T53-11-12, dated 3 February 1955.

stretch-type yarns, were evaluated in sock form and the test data obtained are reported herein.

III MATERIALS

The first phase of the investigation was the analysis of rib dress socks made from a specific all-nylon stretch yarn combined with nonstretch yarn using the 3 available systems. This phase was undertaken to ascertain which yarn-combining system had the greatest advantage for use in military hosiery. The types of combining systems as well as the sock constructional details are shown in Table I.

Knitted simultaneously with the above-described socks was a group of rib dress and cushion-sole socks which employed the *plating* system only and which included several of the commercially available stretch-type nylon yarns. Selection of the plating system was made at the time, since it was believed that this approach was the most logical one for combining a stretch with a nonstretch element without significantly affecting the overall stretch characteristics of the socks. This phase of the investigation provided data for ascertaining the laboratory performance characteristics of the various stretch yarn types under specific testing conditions. Table II lists the pertinent constructional and yarn data for these plated items.

TABLE I
Constructional Details of Rib Dress Socks Using Various Combining Systems

Combining system	Yarn size	Knitting machine	Sock construction
Torque yarn "A"—100% Torque yarn "A" plated over cotton Torque yarn "A" plied with cotton Torque yarn "A" corespun with cotton	200 denier 140 D nylon & 40/1 cotton	168 N Komet	6 x 3 rib

TABLE II
Constructional Details of Socks Utilizing Various Stretch Yarn Types in a Plated System

Yarn type	Yarn size	Knitting machine	Sock construction
a) Rib socks with nylon yarn over cotton			
Torque yarn "A" Torque yarn "B" Nontorque yarn "C" Nontorque yarn "D"	140 D nylon & 40/1 cotton	168 N Komet	6 x 3 rib
b) Cushion sole socks with nylon yarn over wool terry			
Torque yarn "A" Torque yarn "B" Nontorque yarn "C" Nontorque yarn "D"	140 D nylon & 1/20 terry	120 N Banner	jersey

TABLE III
Effect of Load on the Elongation Properties of Rib Socks using Various Yarn-Combining Systems
Elongation (%)

Yarn-combining system	Load (lb) 1.8	4.0	5.0	6.3	8.3	10.5
100% Torque yarn "A"	27.1	51.5	57.0	65.2	72.9	79.0
Torque yarn "A" plated over cotton	28.0	45.0	49.3	54.0	58.9	64.0
Torque yarn "A" plied with cotton	29.9	47.6	52.0	55.4	58.8	65.7
Torque yarn "A" corespun with cotton	18.7	31.2	35.3	37.8	40.9	45.8

IV EXPERIMENTAL TEST METHODS AND APPARATUS

The elongation, recovery, and dimensional stability of the rib and cushion sole socks described in paragraph III were determined by using the Schiefer Sock Measuring Device described in Specification CCC-T-191, Method 7560. The testing technique employed to evaluate these specific physical characteristics in the foot length dimension included the following:

A) ELONGATION——The socks were initially subjected to a pretension load of 2½ ounces in order to obtain a base line foot length dimension. The pretensioning load was determined experimentally and was found to have no perceptible effect on the foot length measurement. Loads ranging from 1.8 to 10.5 pounds were then applied. After the application of a specific load, a period of one minute elapsed before the foot length measurement was made. Elongation was computed as follows:

$$\text{Elongation, percent} = \frac{a-b}{b} \times 100$$

where:

a=foot length measurement under a given stress condition.

b=original pretensioned foot measurement.

B) RECOVERY —— After the pretensioned load was applied and the foot length dimension under these conditions obtained, a 5-pound load was applied. The stretch foot length measurement was taken after the sock had been subjected to the definite load for a period of 5 minutes. The load was then removed and the sock permitted to relax on the foot form of the apparatus for 5 minutes. A pretension measurement was again taken after the relaxation period. Recovery was computed as follows:

$$\text{Recovery, percent} = \frac{a-c}{a-b} \times 100$$

where:

a=foot length measurement under a 5-pound load and after a 5-minute period.

b=original pretensioned foot length measurement.

c=pretensioned foot length measurement after relaxation period of 5 minutes.

Measurements were taken of both elongation and recovery to the nearest 0.1 of an inch and percentages reported to the nearest 0.1 of a percent.

C) SHRINKAGE —— The rib dress socks were subjected to the cotton mobile laundering procedure as described in Specification MIL-S-12549A (QMC) Socks, Men's, Cotton, Ribbed.

The cushion-sole socks were given a 2-hour accelerated laundering as specified in Specification MIL-S-48C, Socks, Men's, Wool, Cushion Sole.

D) CHLORINATION —— The 100 percent stretch nylon rib dress socks were subjected to the Controlled Chlorination Process [2] to determine the effect of this treatment on elongation, recovery, and bursting strength. The effect of chlorination treatments on the physical characteristics of socks utilizing wool and wool/cotton mixtures is generally known, but the effect of this particular treatment on the stretch nylon and wool combination has not been determined. A 100 percent nylon item was used for this phase of the investigation to obtain a quantitative indication of the effect of chlorination on the nylon stretch yarn without the need for correcting or adjusting for the presence of the nonnylon component.

[2]Textile Series Report No. 46, "The Treatment of Army Socks for Shrink Resistance," OQMG—August 1947.

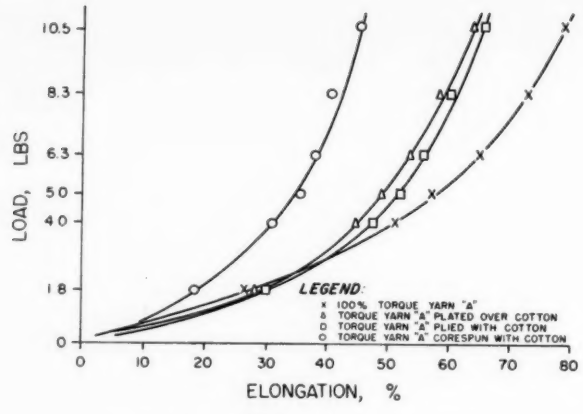


Figure 1
Load vs elongation for rib socks from various stretch yarn systems

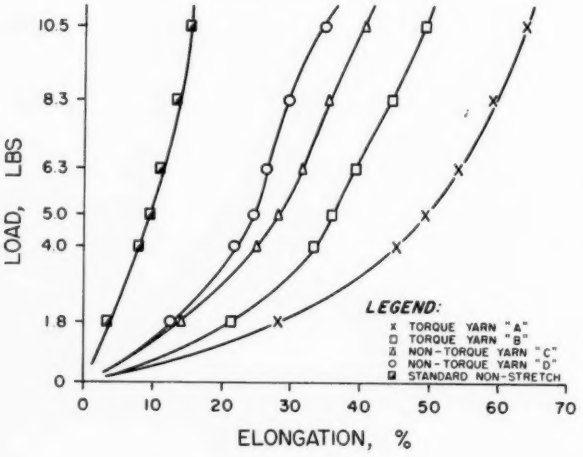


Figure 2
Load vs elongation for rib socks from various stretch yarns plated over cotton

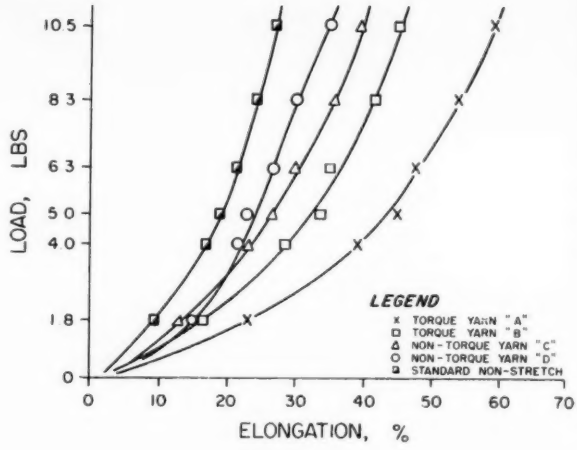


Figure 3
Load vs elongation for cushion sole socks from various stretch yarns plated over terry

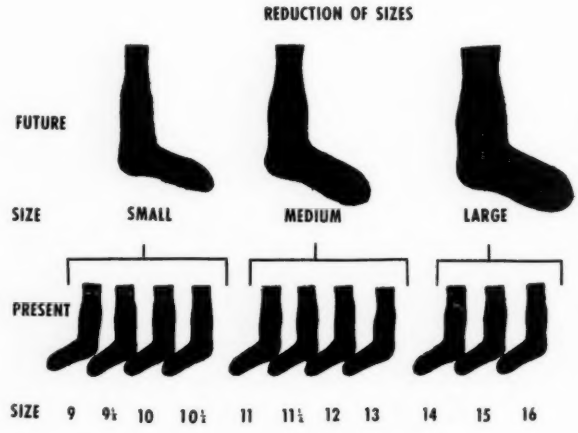


Figure 4
Development of stretch-type cushion sole socks

V RESULTS AND DISCUSSION

A) EVALUATION OF 3 SYSTEMS OF COMBINING STRETCH AND NONSTRETCH YARNS——The results obtained on the effect of load on the elongation of rib socks knitted with one type of torque stretch nylon yarn (torque yarn "A") but varying in the method of combining the stretch with the nonstretch component are summarized in Table III, and graphically illustrated in Figure 1. From the data in Table III, it is evident that the use of the 100 percent torque yarn without a nonstretch component yielded the greatest degree of elongation. Of the combination systems, the corespun was the poorest in elongation, thus the complete enveloping of the stretch nylon with a relatively nonelastic element, such as cotton, appears to have a constricting or retarding effect on elongation properties.

The plating and plying (ie, twisted) systems of combined stretch nylon and cotton have less overall stretch than the 100 percent nylon but appreciably more than the corespun system. Socks made by the plating and plying systems are quite similar in their stretch characteristics.

The plating system is basically a knitting technique and differs from the plied and corespun systems in that it does not directly combine stretch and nonstretch elements as integral units of a knitting yarn. However, the noted decrease in elongation of a sock employing the plated principle when compared to the stretch of a sock employing 100 percent stretch nylon may be attributed to the unequal performance of the two dissimilar materials (stretch and nonstretch) in a plated sock structure when subjected to a stress system. In view of the above, it is reasonable to assume that any attempt to combine a stretch yarn with a nonstretch yarn may significantly decrease the stretch or elongation potential of the basic stretch nylon used.

In Figure 1, the relationship between load and elongation is curvilinear and appears to be parabolic in nature. A 5-pound load was selected to evaluate and compare the elongation properties of stretch-type socks because it represents a condition relatively unaffected by initial loading techniques and is still far removed from the elastic limit of the socks. Furthermore, since current military hosiery specifications require the use of a 5-pound load application for measuring foot lengths (before and after laundering) to determine dimensional stability to laundering, this same measuring technique may be employed as a testing method

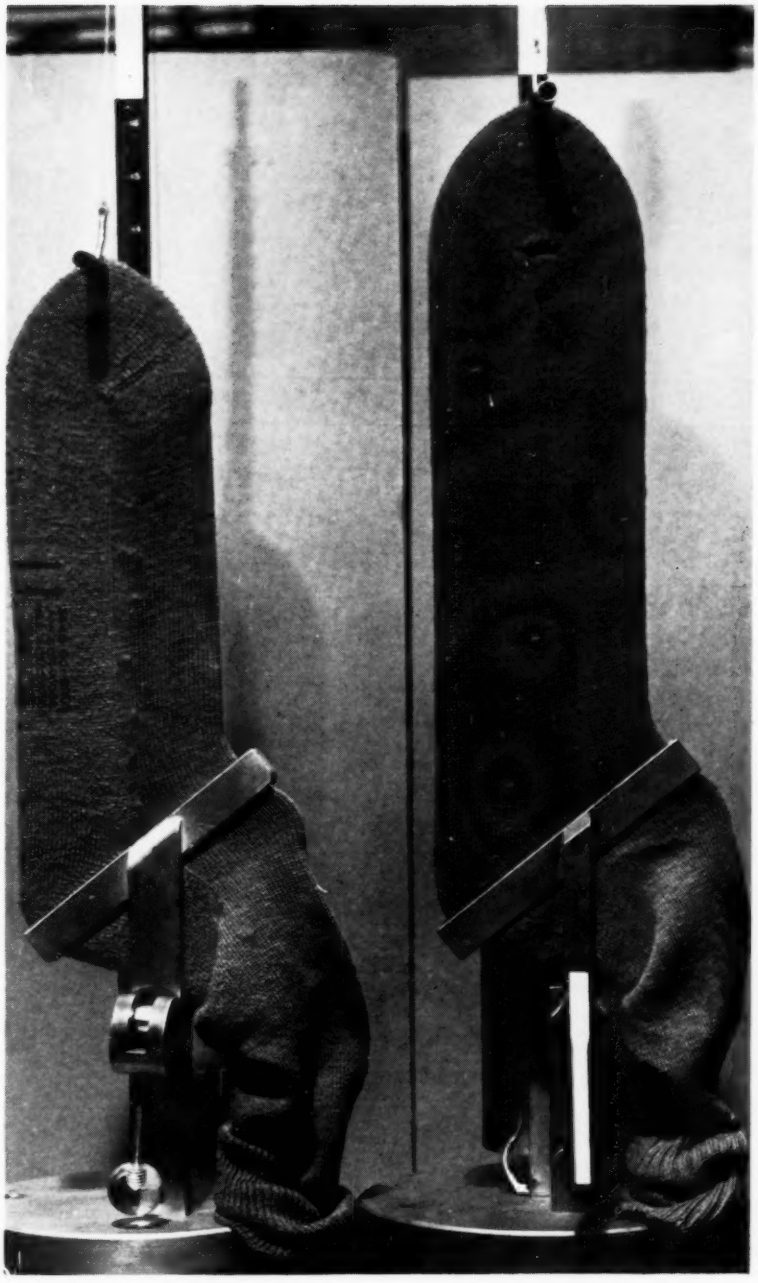
for evaluating the stretch characteristics of socks for specification purposes. In addition, cushion-sole socks subjected to a stress approximately equivalent to a 5-pound load were found to be satisfactory for fit when field tested.

B) EVALUATION OF TORQUE AND NONTORQUE NYLON STRETCH YARNS——The elongation data presented in Table III and Figure 1 indicate that the plating and plying systems of combining stretch with nonstretch yarns compare favorably with each other and suggest that either may prove equally satisfactory for use in the manufacture of military hosiery. Despite the superior elongation performance of the socks consisting of the 100 percent torque nylon stretch yarn "A", possible physiological problems that may be encountered as a result of wearing nylon next to the skin under military conditions may limit its use in this form for military hosiery. Therefore, it became necessary to determine the relative behavior of the various stretch-type yarns when combined with cotton and wool in the Army rib dress and cushion-sole socks, respectively. As pointed out previously, while both the plating and plying systems appeared to be satisfactory, only the plating system was investigated in this study.

Four commercially available nylon stretch yarns (2 torque and 2 nontorque) were used in the construction of rib and cushion-sole socks in which the stretch nylon was plated over cotton and wool terry, respectively. These items were evaluated to determine the effect of varying loads on their elongation properties. The results of this phase of the investigation are contained in Table IV and illustrated in Figures 2 and 3.

1) *For rib socks, plated over cotton.* A careful analysis of the data shown in Table IVa and the curves shown in Figure 2 indicates that torque yarns, when employed in a plated system, possess greater elongation than nontorque yarns. Torque yarn "B", while significantly poorer in elongation performance than torque yarn "A", is still somewhat better than the two nontorque yarns. The curves further reveal that nontorque yarn "C" has slightly more elongation, for given loads than nontorque yard "D".

2) *For cushion-sole socks plated over wool terry.* An examination of Table IVb and Figure 3 indicates the existence of a pattern of elongation generally similar to that reported for the rib socks (see Figure 2). The test data of Table IVb again show that torque yarns have superior elongation to nontorque yarns. The relationship between socks made from torque yarns "A" and "B" is approximately the same as that found in the case of the rib socks. Socks made from nontorque yarn "C" possessed less elongation than those made from either of the torque yarns and slightly more than the nontorque "D". It may be noted that the elongation of the standard nonstretch cushion-sole sock is approximately twice that of the corresponding rib sock. This is accounted for by the inherent difference of the basic fibers used, that is, wool for cushion-sole socks and cotton for rib socks.



Standard Experimental stretch-type

Figure 5
Effect of load on the stretch characteristics of cushion-sole socks

3) *Experimental cushion-sole socks.* It should be brought out at this point that a cushion-sole sock had been

TABLE IV

Effect of Load on the Elongation Properties of Socks Employing Various Nylon Stretch Yarns

Elongation (%)

Yarn types	Load (lb) 1.8	4.0	5.0	6.3	8.3	10.5
a) Rib socks, plated over cotton						
Torque "A"	28.0	45.0	49.3	54.0	58.9	64.0
Torque "B"	21.4	33.5	36.4	39.1	44.7	49.2
Nontorque "C"	14.0	25.0	28.2	31.4	35.5	40.8
Nontorque "D"	13.7	21.9	24.7	26.0	29.8	35.2
Standard (100% cotton)	3.5	8.1	9.7	10.7	13.2	15.2
b) Cushion-sole socks, plated over wool terry						
Torque "A"	22.5	39.0	44.9	47.5	54.0	59.0
Torque "B"	16.0	27.9	33.5	35.1	41.2	45.4
Nontorque "C"	13.1	22.4	26.8	29.7	35.3	39.6
Nontorque "D"	15.0	22.1	22.8	26.5	30.1	35.0
Standard	9.6	17.0	18.8	21.5	23.8	27.2

TABLE V

Effect of Laundering on the Shrinkage, Elongation and Recovery Properties of Rib Dress Socks[1]

(in %)

	Original		Laundered[2]		
	Elongation	Recovery	Shrinkage	Elongation	Recovery
a) Using various combining systems					
100% Torque yarn "A"	57.0	90.0	5.9	49.5	90.7
Torque yarn "A" plated over cotton	49.3	87.8	6.7	47.8	91.5
Torque yarn "A" plied with cotton	52.0	89.1	5.2	55.2	92.5
Torque yarn "A" corespun with cotton	35.3	90.0	5.2	38.7	89.5
Standard cotton	9.7	73.3	6.4	13.5	77.0
b) Using various nylon stretch yarns[3]					
Torque yarn "A"	49.3	87.8	6.7	47.8	91.5
Torque yarn "B"	36.4	84.2	2.2	52.8	91.8
Nontorque yarn "C"	28.2	86.5	1.5	32.3	94.2
Nontorque yarn "D"	24.7	79.3	2.2	33.0	85.2
Standard cotton	9.7	73.3	6.4	13.5	77.0

[1]Five-pound load level employed.
[2]Shrinkage procedure outlined in Specification MIL-S-12549 (QMC) Socks, Men's, Cotton, Ribbed.
[3]Stretch yarns plated over cotton.

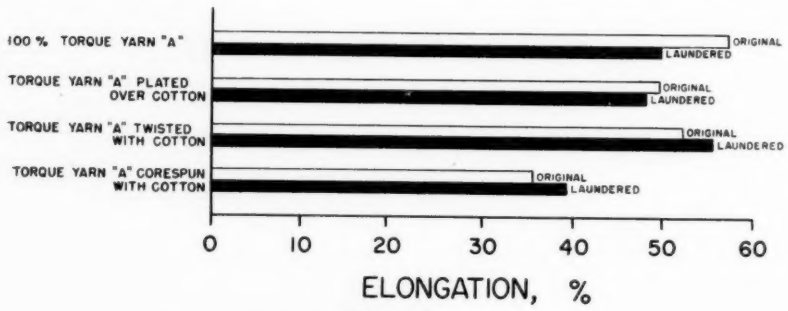


Figure 6
Effect of laundering on elongation of rib socks from various stretch yarn systems

developed employing the plating principle using torque yarn "A". This sock was knitted and finished in three sizes (small, medium and large), designed to reduce from 11 to 3 the number of sizes of cushion-sole socks required to fit the Army population, as shown in Figure 4. These experimental stretch-type cushion-sole socks have been field tested at hot-dry, temperature and cold test sites. An Interim Field Test Report[3] covering the hot-dry phase indicates that the 3-size system of the socks is satisfactory for sock size categories from 9 to 14 inclusive.

In view of the favorable interim field test results with regard to fit and the laboratory data indicating that these items possessed an average elongation of 35 percent for all sizes when evaluated under a 5-pound load level, it was felt desirable to consider these factors as possible criteria for establishing physical requirements for a performance-type of specification for stretch-type cushion-sole socks. After examination of the data in Table IVb and the curves in Figure 3, it becomes apparent that torque yarns "A" and "B" meet this criterion for stretch or elongation, while nontorque yarns "C" and "D" do not. In other words, the torque yarns evaluated appear to fulfill the requirement of a possible 3-size sock system, while the nontorque yarns of the type used in this study in the cushion-sole sock construction may require more than three sock sizes to fully cover the present Army tariff of sock sizes.

Other findings reported in the Interim Field Test Report mentioned above are that the experimental socks not only are a better fit but are more comfortable than the standard socks. The report further revealed that the experimental socks shrank less after laundering, indicating better dimensional stability and thus probable continued proper fit. The consensus among the test subjects in the field test was that the experimental socks are preferred for wear to the standard sock.

Figure 5 illustrates the relative extensibility of the standard versus the stretch-type cushion-sole socks when subjected to a stress of 5 pounds utilizing the Schiefer Sock Measuring Device.

C) EVALUATION OF YARN - COMBINING SYSTEMS AND NYLON STRETCH YARNS AFTER LAUNDERING —— The data reported up to this point have dealt exclusively with the evaluating of stretch-type military hosiery, employing various yarn systems and/or types, in an original or "as received" condition. As a basis for assessing stability to laundering, the socks listed in Tables I and II were subjected to either the cotton mobile laundering or the 2-hour accelerated laundering[4], depending on whether the socks consisted basically of cotton or of wool. The socks were subsequently evaluated to ascertain the effect of laundering on elongation, recovery and dimensional stability. The evaluation of these properties was conducted at the 5-pound load level only. This test load condition was selected for the reasons previously mentioned.

1) *Elongation.* The elongation results are shown in Table V and in Figure 6. The socks made from the plied system increased in elongation after laundering so that they approximated the stretch of the all-nylon before laundering. The elongation of the plated sock changed little after laundering. It is inter-

[3]FEA 55013, Socks, Wool, Cushion-Sole, T54-13, dated 27 December 1955.

[4]Rib and cushion-sole socks subjected to specification laundering procedures outlined in MIL-S-12549A (QMC) and MIL-S-48C, respectively.

esting to note that the 100 percent stretch nylon experienced the greatest loss of elongation due to laundering. The corespun system exhibited a slight increase in elongation; but has the poorest elongation before and after laundering.

The data presented in Table Vb and Figure 7 show the effect of laundering on the elongation of rib socks made from the various types of stretch yarns in the common plating system. The data indicate that all the stretch yarn socks, with the exception of the one knitted with Torque Yarn "A", increased in elongation after being laundered. This increase in elongation may be due to overboarding of the socks in the finishing operation. That is, if the socks were originally knitted to a specific foot length, eg, 10 inches, and were boarded so as to set the foot length at 11 inches, then upon laundering the socks will shrink to 9 inches. When the 5-pound load is applied to determine elongation, and the lengths of the original and laundered item are approximately the same, the percentage of elongation of the laundered sock will be greater than that of the original sock because of the shorter length upon which the amount of stretch is based. Another factor which may account for this increase in elongation is the method utilized to produce the various stretch yarns. It is possible that the crimp in the nontorque yarns undergoes a change after laundering which accounts for a reduction in the length of the sock. Therefore, if these socks are capable of elongating to the same approximate absolute length after laundering, the percentage of elongation is increased because of the shorter length upon which the stretch is based. This line of reasoning also applies to torque yarn "B". Since torque yarn "A" showed practically no change in elongation after laundering, it was either properly boarded or the method of producing this type of stretch nylon precludes any great effect on its elongation as a result of laundering. Despite these increases in elongation after laundering, socks made from nontorque yarns do not approach in elongation those made from torque yarns either before or after laundering.

According to the data shown in Table VI and Figure 8, the observations just made regarding the rib socks apply to the cushion-sole socks also. However, the degree to which the nontorque yarns increased in elongation is much greater in the cushion-sole socks than in the rib socks. The reasons for the increase in elongation (discussed above for the rib socks) also appear pertinent for the cushion-sole socks.

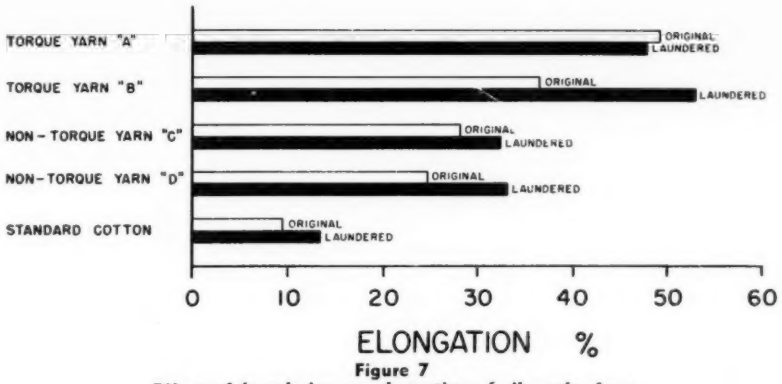


Figure 7
Effect of laundering on elongation of rib socks from various stretch yarns plated over cotton

TABLE VI

Effect of Laundering on the Shrinkage, Elongation and Recovery Properties of Cushion-Sole Socks Employing Various Stretch Yarns[1]

(in %)

Stretch yarn types[2]	Original		Laundered[4]		
	Elongation	Recovery	Shrinkage[3]	Elongation	Recovery
Torque yarn "A"	44.9	96.0	7.1	42.5	97.5
Torque yarn "B"	33.5	88.5	5.1	36.5	94.0
Nontorque yarn "C"	26.8	96.1	6.3	32.2	96.7
Nontorque yarn "D"	22.8	87.3	3.9	32.1	88.0
Standard	18.8	87.5	5.7	15.0	76.0

[1]Five-pound load level employed.
[2]Various stretch yarns plated over wool terry.
[3]Total shrinkage reported.
[4]Shrinkage procedure outlined in Specification MIL-S-48C.

2) *Recovery.* The data recorded in Tables V and VI indicate that laundering has no significant effect on this recovery of the stretch-type rib or cushion-sole socks evaluated, regardless of the combining systems and /or yarn types. Since the recovery, in general, is satisfactory for the test specimens, it is concluded that no difficulties may be expected from this standpoint. If, on the other hand, recovery has been poor, it would have indicated that the socks were being permanently deformed and might present a serious size fitting problem.

3) *Dimensional stability.* The dimensional stability of rib socks employing various combining systems, as indicated by the data in Table Va, is in all but one case, equal to or better than that of the standard sock. The plated system shows a slightly higher shrinkage than the standard sock, however the difference is not significant.

From an analysis of the shrinkage data in Table Vb (rib socks employing various stretch yarns), it is apparent that socks made from torque yarn "B" and the two nontorque yarns (C & D) possess significantly better dimensional stability than those made from torque yarn "A" or the standard cotton sock. Since the shrinkage percentage is computed at the 5-pound load level, before and after laundering, those socks that showed an improvement in elongation after laundering generally yielded low shrinkage values. This is obvious in view of the fact that these socks extended approximately the same number of inches after laundering as they did before laundering, even though they were shorter after laundering.

D) EFFECT OF CHLORINATION ON NYLON STRETCH YARNS ——Two basic yarns are used to knit the standard cushion-sole sock. These are a worsted yarn for the construction of the terry "loop" on the inside of the foot area and a merino yarn (50/50 wool/cotton) for the knitting of the remainder of the sock. In view of the felting tendencies of wool when subjected to field launderings, the wool in the finished sock is treated for resistance to felting shrinkage in stock, top, yarn or sock form by a chlorination method. Most cushion-sole sock contractors treat these socks for felting shrinkage control by utilizing the Controlled Chlorination Method.[5] With the introduction of stretch-type nylon, a

[5]Textile Series Report No. 46, "The Treatment of Army Socks for Shrink Resistance." OQMG, August 1947.

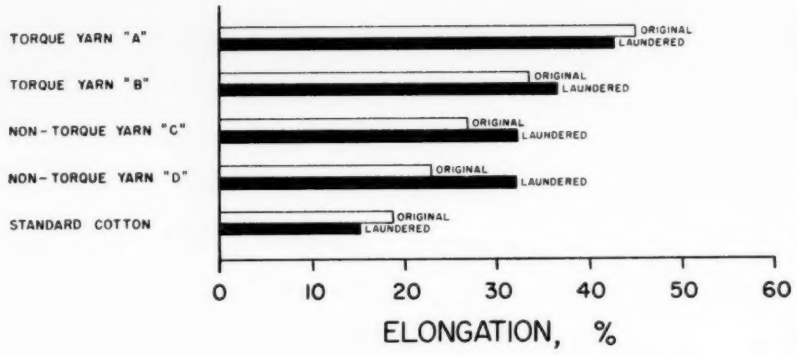


Figure 8
Effect of laundering on elongation of cushion-sole socks from various stretch yarns plated over terry

TABLE VII

Effect of Chlorination on the Elongation[1], Recovery[2], and Bursting Strength[3] Properties of Stretch-type Nylon Rib Socks

Yarn types	Untreated			Treated			Loss or gain		
	Elongation (%)	Recovery (%)	Bursting strength (lbs)	Elongation (%)	Recovery (%)	Bursting strength (lbs)	Elongation (%)	Recovery (%)	Bursting strength (lbs)
Torque yarn "A"	49.1	85.1	78	46.0	81.7	63	−6.3	−4.0	−19.2
Torque yarn "B"	35.2	85.7	93	32.8	78.9	85	−6.8	−7.9	−8.6
Torque yarn "E"	33.1	80.8	83	35.9	82.6	78	+8.5	+2.2	−6.0
Nontorque yarn "D"	30.1	84.5	108	28.5	76.2	83	−5.3	−9.8	−23.1

[1]Elongation properties evaluated at the 5-pound load level.
[2]Recovery properties evaluated at the 5-pound load level.
[3]Method 5120—Strength of Cloth, Ball Bursting Method—Specification CCC-T-191.

question arose regarding the effect that chlorination might have on the physical properties of cushion-sole socks made from such yarns. To answer this problem, an experiment was designed in which commercially available 100 per cent stretch-type nylon dress socks were chlorinated and subjected to laboratory analysis. Rib socks of various stretch-type nylon yarns were procured, were treated in sock form using the Controlled Chlorination Method and were evaluated for elongation, recovery and bursting strength. The socks did not contain wool and would not customarily be treated for felting shrinkage control. However, it was believed that the treating and analysis of such socks would give pertinent data for future specification action with regard to a shrink-resistant treatment requirement for stretch-type cushion-sole socks. It should be pointed out that the socks evaluated in this phase of the investigation varied in construction. Consequently, only comparisons between untreated and treated items for a specific stretch yarn type may be considered valid.

The data pertaining to chlorinated 100 percent stretch-type nylon rib dress socks are contained in Table VII. It may be seen that the chlorination treatment tended to reduce the elongation and recovery of three of the four stretch socks evaluated. In fact, the elongation loss of 5.3 percent reported from socks made from nontorque yarn "D" which elongated less originally than any of the other types would probably be such as to make it unsatisfactory for use in military hosiery. This assumption is based on the established parameters for elongation of rib and cushion-sole socks incorporating nontorque yarns used in this investigation.

Further analysis of the data shown in Table VII indicates that the chlorination treatment more or less affects the bursting strength characteristics of the nylon stretch-type dress socks evaluated. Of the four yarn types evaluated, torque yarn "A" and nontorque yarn "D" appeared to be significantly affected.

VI CONCLUSIONS

The results of the data collected and conclusions drawn from the various field test reports show that the "stretch concept" can be successfully used in military hosiery, thereby providing a means for reducing the number of sizes used by the military services. In addition, stretch-type yarns will provide for better fit, greater and more uniform dimensional stability to laundering, and they appear to have greater durability to wear.

The results indicate that either the plating or plying systems of combining a stretch nylon with nonstretch cotton and/or wool is satisfactory. Items made from stretch yarns using the plating system were superior in elongation to the standard rib and cushion-sole socks. Field testing indicated that socks composed of stretch yarns with an average of 35 percent elongation at the 5-pound load level are satisfactory for fit. Both rib and cushion-sole socks made from torque-type yarns possess greater elongation than do those made from nontorque yarns. None of the items made from nontorque yarns approaches the desired 35 percent elongation goal at the 5-pound load level. Use of such yarns would require more than the proposed three sizes to cover the range of established sizes (9 to 16).

In view of these facts, it is concluded that the torque-type stretch yarns show the greater promise for use in stretch-type military hosiery. In assessing these data, it should be pointed out that the socks evaluated were manufactured by a single processor and the finishing techniques employed may not necessarily represent optimum conditions. In addition, the techniques as well as the technological "know how" for producing these yarns may possibly have been improved since this work was initiated; this would undoubtedly tend to improve the elongation characteristics of the nontorque yarns.

The dimensional stability to laundering of socks made from stretch-type yarns is better than that of the standard sock. The shrinkage data demonstrated that some of the stretch yarns are approximately equal to the standard after a single specification laundering, but the field test [4] showed that after continued wear and repeated launderings, the stretch-type yarns are more stable. Since the shrinkage difference between the torque and nontorque yarns is insignificant, there is little choice with respect to this particular property. However, since the elongation of socks made from torque yarns is generally superior to those made from nontorque yarns after laundering, it may be surmised, from an overall viewpoint, that torque yarns more nearly approach the requirements desired.

While the interim field test report concerning cushion-sole socks at hot-dry locations did not state whether or not the stretch-type socks have greater durability to wear, the field test performed on 100% nylon, torque "A", rib stretch socks revealed that these latter socks were more durable than the standard cotton rib sock by an average ratio of 1.7 to 1.0.

[4]QMBT 53065, Socks, Men's, Rib, Nylon (elasticized) T53-11,-12, dated 3 February 1955.

APPENDIX A

Field Tests Conducted on Stretch-type Military Hosiery and Status of Each Test

Field Test No.	Test Item	Status
QMBT 53065 (rib socks)	T53-11-100% torque yarn "A" T53-12-100% nontorque yarn "C"	completed
FEA 55016 (rib socks)	T53-14 torque yarn "A" plated over cotton in the entire sock	incomplete (no report)
FEA 55013 (cushion-sole socks)	T53-13 torque yarn "A" plated over wool terry in foot portion of sock only:	
1) Hot-dry location		incomplete (interim report)
2) Temperate location		incomplete (no report)
3) Cold location		incomplete (no report)

An evaluation of the effect of chlorination on various properties of nylon stretch rib socks showed losses in bursting strength as high as 23% for some types. It is not known whether or not this reduction would seriously affect the functionability of hosiery utilizing stretch nylon yarns. If it is found inadvisable to chlorinate stretch-type cushion sole socks in sock form, the wool to be used in this type of sock may be treated for felting shrinkage control in stock, top or yarn form.

ACKNOWLEDGMENT

We are grateful for the kind cooperation and assistance that has been furnished by the hosiery industry in working out some of the prototypes that are discussed in this report. Particular mention should be made of James A Power of the Interwoven Stocking Company, who provided the various experimental socks that were used in this investigation. The assistance of Mrs Eleanor Gannon, who made the physical tests; G J Groh, chief, Textile A E Section; H H Brandt, chief, Fabric Engineering Section; L I Weiner, chief, Textile Engineering Laboratory Branch; and S J Kennedy, chief, Textile, Clothing & Footwear Division is also gratefully acknowledged.

KAE EXHIBITORS——

(*Concluded from page 269*)

RICHMOND OIL, SOAP & CHEMICAL CO, INC

1041 Frankford Ave, Philadelphia 25, Pa
Space 202

On display—Orlube #100 for knitting sweaters; Scour #188 for washing wool and wool blend sweaters and hose; Retarder #1524 for dyeing Orlon with basic dyestuffs; Rubberknit #1528 for lubrication of covered rubber and raw rubber thread; Coning Lubricant #353 for lubrication of Ban Lon yarn; Coning Lubricant #1384 for lubrication of Fluflon and Superloft and seamless hosiery yarns; Roscour #1603, a low pH soap base scour for the one-bath method of scouring and dyeing women's hosiery.

In attendance—W Alkus, president; Morton W Levi, chemical engineer; J W Schenkel, chief chemist.

SCHOLLER BROS, INC

Collins & Westmoreland Sts, Philadelphia 34, Pa
Spaces 463-464-465-474-475-476

On display—Dura Beau and Lanolized finishes for conventional and stretch stockings and knitted fabrics; samples of Schollerized Processed (shrinkage control) wool fabrics.

In attendance—E S Atkinson, L M Boyd, E F Fitzgerald, Jr, A T Glenn, J F Noble, William Jackson, Jr, D E Robertson, J O Sweitzer, C H Schuettler, W R Sargent, W S Truette, A H Miller and Robert Martin.

SCOTT TESTERS, INC

101 Blackstone St, Providence, R I
Spaces 297-298

On display—IP-4 Incline-plane tensile tester will be shown with several types of clamp equipment; Scott-Clemson flat bundle fiber tester; Scott twist counter with singles yarn twist examiner; Model X-5, an inexpensive tensile tester for yarn and thread.

In attendance—Factory personnel.

SMITH, DRUM & CO

432 W Allegheny Ave, Philadelphia 33, Pa
Spaces 129-130-131-132

On display—High-temperature package dyeing machine, package yarn carrier with miscellaneous packages, laboratory model package dyeing machine, paddle dyeing machine for knit goods processing, rotary type dyeing machine for hosiery, and skein dyeing machine for Hi-bulk yarns and others.

In attendance—R N Smith, president; A Bagian, vice president; A P March and W A Fuchswanz, sales; Parrott & Ballentine, southern sales.

TUBULAR TEXTILE MACHINERY CORP

33-61 54th St, Woodside, LI, N Y
Spaces 166-167-168-169

On display—Tube-Tex finishing machinery for circular knit fabrics: extractor pad, reel-jet dryer, tensionless calendar, straight line calendar, electronic framer and steamer, and matching machine.

In attendance—Eugene Cohn, Joseph Cohn, Don Foreman, John Sasson and Lee Rothenberg.

TURBO MACHINE CO

Lansdale, Pa
Spaces 59-60

On display—Preboarding and boarding machinery and accessories.

In attendance—E J Berger, vice president; B C Hall, F Huguenin, P Wenhold, W K Wyatt, J R Brownell, E Hughes, M M Lihn and G Brewin.

UNITED STATES TESTING CO, INC

1415 Park Ave, Hoboken, N J
Spaces 462 and 467

On display—The pilling tester, the twist tester for singles yarn and a knit shrinkage gauge.

In attendance—F P Brennan, assistant sales manager; C M Michie, southern representative; E G Railo, technical service.

UTICA NOVELTY & MILL SPECIALTY CO

2145 Dwyer Ave, Utica, N Y
Spaces 160-161-162

On display—Extractor loader and calendar, electric automatic lay-up machine, combination cutting and winding mchine, and automatic double cuff cutting and turning machine.

In attendance—J A Firsching, Jr, J A Firsching, 3rd, and Donald Firsching.

THE STANDARDIZATION OF TEST METHODS FOR TEXTILE AUXILIARIES • II—DETERMINATION OF VAT ACID DISPERSION POWER OF SURFACTANTS*

G SCHWEN and C RACKEMANN
Badische Anilin- & Soda-Fabrik AG
Ludwigshafen a Rhein, Germany

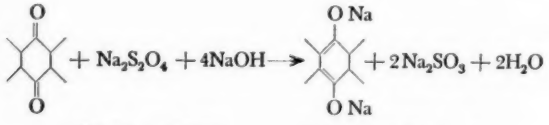
Translated by
HERMAN A NELSON
Royce Chemical Co
Carlton Hill, NJ

In *Am Dyestuff Reptr* 39, No. 14, July 10, 1950, there appeared a method of testing the dispersing power of surfactants, under the title "A Method of Evaluating Protective Colloids for Vat Dyeing" by Paul Wengraf.

It occurred to me that translation of this present article into English would make it possible for interested workers to compare it with the method devised by Dr Wengraf; hence this translation by Mr Nelson.—P J WOOD.

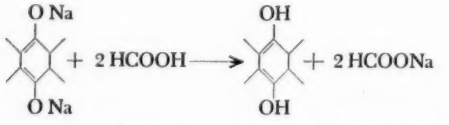
INTRODUCTION

IN THE reduction of vat dyes with hydrosulfite (sodium dithionite), the sodium salt of the leuco vat dye is formed. This is called "vatting" in the parlance of the dyer.



Vat dye — pigment (insoluble) | Na leuco vat dye — vat (soluble)

If the vat is acidified, eg, with formic acid, the leuco vat dye is released from its sodium salt according to the following equation:



Na leuco vat dye — vat (soluble) | leuco vat dye — vat acid (insoluble)

The leuco vat dye is known to the dyer as "acid vat" (*1*) and has practical application.

Although insoluble in water, the "vat acid" can be kept in colloidal suspension by the use of a suitable surfactant in a manner similar to calcium soaps (*2*) or azo pigments (*3*). They are similar in solubility to the "unvatted" dyes (vat dye pigments) and like them have virtually no affinity for vegetable fibers.

In the dyeing of cotton, the vat acids can be introduced where vat dyes are not available in a very finely divided form as, for example, Colloisol types of Indanthrene dyes.

On polyamide fibers, the vat acids exhaust like acid colors, and can be oxidized to fast colors.

In the search for suitable surfactants to keep the vat acids in colloidal suspension, the dispersing agent known as dinaphthylmethane sulfonate (see #5 in Table I) was found by J Mueller (*4*) to be especially effective. It has since been used in "vat acid processes." In the reduced vat exhaustion process (*5*), in which a part of the vatted dye is present as the vat acid, this product has been proven to be a good dispersing agent.

Quantitative information on the amounts necessary for dispersion are not yet available.

Encouraged by the results of experiments on the determination of the dispersing power of these agents on calcium soaps (*2*) and on azo pigments (*3*), we tested a number of anionic, cationic and nonionic surfactants to determine their ability to prevent the settling of vat acids.

The results (see Table I) show:

1) the limited variation in individual values,
2) the dependency of dispersive action on:
   a) the constitution of the surfactant
   b) the constitution of the dye, and
3) the correctness of the practical observation that dinaphthylmethane sulfonate (#5 in Table I) exhibits the best dispersive action. This can be construed as evidence of the practicability of this method of testing.

Though this method of determination can lay no claim to analytical accuracy, it nevertheless makes it possible for the man in the plant to determine the dispersive power of commercial surfactants with vat acids. In addition it will also serve to test surfactants under as many individual conditions of use as possible. Gradually a composite picture of the action of these compounds will emerge.

EXPERIMENTAL

In these tests we used commercial surfactants of various constitutions. They were tested in their commercial form containing diluents and, possibly, impurities. The amounts used were calculated back to a 100% -active-ingredient basis. Three highly concentrated Indanthrene dyes containing a minimum of stabilizers were used:

1) Indanthrene Brilliant Green FFB Powder, Ultra Conc (*6*)

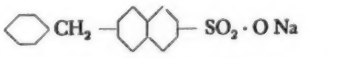
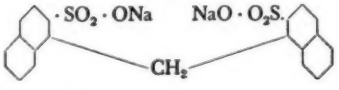
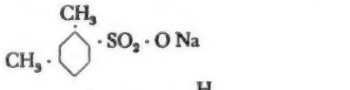
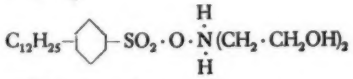
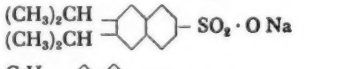
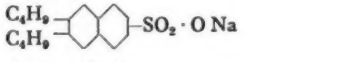
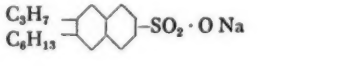
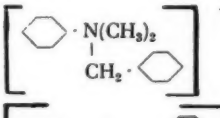
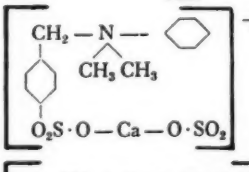
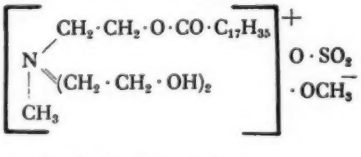
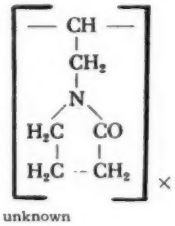
Vat color: blue violet
Vat acid color: bordeaux

2) Indanthrene Olive Green B Powder, Ultra Conc (*7*)

Vat color: blue black
Vat acid color: deep brown

*Reprinted from *Melliand Textilberichte* 37, No. 11, 1345-7 (Nov, 1956).

TABLE I

No.	Surfactant	Constitution	Calculated molecular weight	% Surfactant: Indanthrene Brilliant Green FFB	% Surfactant: Indanthrene Olive Green B	% Surfactant: Indanthrene Dark Blue BOA
	ANIONIC PRODUCTS— ALKYL SULFATES					
1	Lauryl sulfate, Na salt	$C_{12}H_{25}O{\cdot}SO_2{\cdot}O\,Na$	288	40; 40; 40	80; 80	10; 10
2	Oleyl sulfate, Na salt	$C_{18}H_{35}O{\cdot}SO_2{\cdot}O\,Na$	370	50; 50; 50	140; 140	12; 12
3	Oleylsulfate, diethanolamine salt	$C_{18}H_{35}O\cdot SO_2\cdot O\cdot \overset{H}{\underset{H}{\dot{N}}}(CH_2\cdot CH_2OH)_2$	435	60; 60; 60	90; 80	12; 12
	ARYL SULFONATES					
4	Benzyl-naphthalenesulfonic acid Na		320	150; 150	300; 300	60; 60
5	Di(2-sulfo-1-naphthyl)-methane, Di-Na salt		472	32; 30; 30	80; 80	8; 8
	ARALKYL SULFONATES					
6	m-Xylolsulfonic acid Na		223	300; 300	300; 300	300; 300
7	Dodecylbenzene sulfonic acid diethanolamine		447	60; 60; 60	140; 140; 140	14; 14
8	Diisopropyl-naphthalenesulfonic acid Na		314	150; 150	300; 300	60; 70
9	Di-n-butyl-naphthalenesulfonic acid Na		242	100; 100; 100	300; 300	40; 50
10	n-Propyl-n-hexyl-naphthalenesulfonic acid Na		356	120; 120; 120	250; 250	30; 30
	FATTY ACID CONDENSATION PRODUCTS					
11	n-Oleylmethyl tauride, Na salt	$C_{17}H_{33}\cdot CO\cdot N\cdot CH_2\cdot CH_2\cdot SO_2\cdot ONa$ CH_3	427	60; 60; 60	100; 100	8; 8
	CATIONIC PRODUCTS					
12	Dimethylphenylbenzyl ammonium chloride		247.5	precipitation	precipitation	precipitation
13	Dimethyl-(p-sulfobenzyl)-(m-sulfophenyl)-ammonium chloride, neutral Ca salt		445.5	precipitation	precipitation	precipitation
14	Methyl-di-(oxyethyl)-stearyloxyethyl-ammonium-sulfonic acid methyl ester		541	precipitation	precipitation	precipitation
	NONIONIC PRODUCTS					
15	Tetradeca-ethyleneglycol-monooleyl ether	$C_{18}H_{35}O(CH_2\cdot CH_2\cdot O)_{14}H$	884	300; 300	290; 290	30; 30
16	Pentacosa-ethyleneglycol-monooleyl ether	$C_{18}H_{35}O(CH_2\cdot CH_2O)_{25}H$	1368	110; 110	30; 30	30; 30
17	Oxyethylene resins	unknown	unknown	190; 190; 190	150; 150	60; 60
	MISCELLANEOUS PRODUCTS					
18	n-Polyvinylpyrrolidone		ca 38,000	190; 190; 190	130; 130	80; 80
19	Spent sulfite cellulose liquor (CaO free)	unknown	—	90; 90; 90	200; 200	30; 30

3) Indanthrene Dark Blue BOA Powder, Ultra Conc (*8*)

Vat color: dark violet
Vat acid color: brown

These three dyes can be reduced by the same method and their reduced liquors are stable for a comparatively long time (up to 5 hours)

METHOD

The principle of the method used is as follows:

Varying amounts of a solution of the surfactant to be tested are mixed with a definite amount of a solution of the sodium salt of the leuco vat dye. After an excess of formic acid is added, the amount of the surfactant which is just sufficient to prevent precipitation of the vat acid is determined.

The amount of surfactant used for a given amount of vat dye is expressed numerically in percent according to the following formula:

$$\frac{\text{grams surfactant}}{\text{grams vat dye}} \times 100$$

The vat acid dispersive power of a surfactant increases as the amount of it required to prevent precipitation of the vat acid formed decreases.

PREPARATION OF SOLUTIONS

1) PREPARATION OF REDUCED LIQUOR* (5 g/l INDANTHRENE DYE)———

*These quantities are correct only for known highly concentrated brands of dyes; for dyes specially standardized, follow the instructions of the manufacturer.

1.25 g Indanthrene dye is made into a paste with
2 ml den alcohol. Into this is poured about
80 ml distilled H_2O at about 60°C.
7.5 ml caustic soda 38° Bé, and
3 g hydrosulfite conc are added and, after a vatting time of about 15–20 minutes, the volume is brought to 250 ml with distilled H_2O. This gives a 0.5% solution of the dye.

2) PREPARATION OF THE TEST SOLUTIONS———The following test solutions of the surfactant to be tested are prepared:

a) 0.5 % aqueous sol = 5.0 g surfactant in 1 l dist H_2O
b) 0.25% aqueous sol = 2.5 g surfactant in 1 l dist H_2O
c) 0.1 % aqueous sol = 1.0 g surfactant in 1 l dist H_2O

Surfactants which form cloudy solutions or colloids are not suitable for these tests.

Based upon the experimental procedure which follows below, the following results were obtained:

a) 0.5 % sol values of 20–300% in increments of 20%
b) 0.25% sol values of 10–150% in increments of 10%
c) 0.1 % sol values of 4– 60% in increments of 4%.

EXPERIMENTAL PROCEDURE

In a test tube (180 x 20 mm) of about 45 ml capacity are mixed:

15– 1 ml of 5%, 0.25% or 0.1% surfactant solution
0–14 ml of dist H_2O to bring to a total of 15 ml sol
5 ml of clear reduced liquor (5 g/l dye)
5 ml dil formic acid (5 ml 85% formic acid made up to 100 ml with H_2O)

25 ml total volume

Under these conditions the pH is normally 3 to 3.5. It is recommended that the pH be kept at this value since the dispersing action is dependent upon pH.

The test tube is covered with the thumb and inverted once to mix up the solution. In order to facilitate the examination of the solubility of the opaque reaction solution, 2.5 ml are removed at once using a graduated pipette. This is transferred to a larger test tube and diluted with 22.5 ml of distilled water. This test tube is again covered with the thumb, inverted once, and the solution tested for clarity.

The exact amount of the surfactant under test necessary to prevent the precipitation of the vat acid is determined.

The total solution, 25 ml; the leuco vat dye solution (5 ml reduced liquor), which contains 5 g/1 Indanthrene dye; and the diluted formic acid (5 ml dil formic acid containing 5 ml 85% formic acid per 100 ml) remain constant. The amount of surfactant is the only variable.

RESULTS

Surfactants of various constitutions were tested with the three originally selected dyes by the foregoing methods. The results are listed in Table I.

LITERATURE CITED

(*1*) Müller, J, *Textilber* **28**, 93-5 (1947); **30**, 214, (364-8) (1949).
(*2*) Kuckertz, H, *Angew Chem* **49**, 273-6 (1936); Schwen, G, *Textilber* **34**, 969-71, DIN 53,903 (1953).
(*3*) Schöller, C and Wittwer, M, BASF, Ger Pat 604,973; Schwen, G, *Textilber* **13**, 485-7 (1932); Schwen, G and Rackemann, C, *ibid* **37**, 456-7 (1956).
(*4*) Müller, J, *ibid* **30**, 366 (1949).
(*5*) Bräuer, M, *ibid* **33**, No. IIE, 176-8, 180-2 (1952).
(*6*) Schultz, G and Lehmann, L, Farbstofftabellen Bd I, No. 1269/70 (1931).
(*7*) BASF, Ger Pat 212,471; Müller, J, *Textilber* **28**, 354 (1947).
(*8*) Schultz, G and Lehmann, L, Farbstofftabellen Bd I, No. 1262 (1931).

General Calendar

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
Gordon Research Conference on Textiles, July 8-12, Colby Jr College, New London, NH

AMERICAN OIL CHEMISTS SOCIETY
April 29-May 1 (Spring meeting, New Orleans); Sept 30-Oct 2, 1957 (Fall meeting, Cincinnati); Apr 21-23, 1958 (Memphis); Oct 20-22, 1958 (Chicago); Spring, 1959 (New Orleans); Fall, 1959 (Los Angeles).

AMERICAN MATERIAL HANDLING SOCIETY
Apr 29-May 3 (7th Materials Handling Exposition, Convention Hall, Philadelphia, Pa)

THE DRYSALTERS CLUB OF NEW ENGLAND
Apr 26 (Hotel Vendome, Boston); June 21 (Annual Outing—Wachusett Country Club, West Boylston, Mass).

THE FIBER SOCIETY
Spring Meeting—May 1-2, 1957, The Clemson House, Clemson S C; Sept 4-6 (Joint meeting with the Textile Institute—Hotel Statler, Boston, Mass)

LOWELL TECHNOLOGICAL INSTITUTE ALUMNI ASSOCIATION
Annual Reunion—May 18 (Lowell and Andover, Mass)

NATIONAL ASSOCIATION OF HOSIERY MANUFACTURERS
NATIONAL KNITTED OUTERWEAR ASSOCIATION
UNDERWEAR INSTITUTE
April 29-May 3 (1957 Knitting Arts Exhibition, Atlantic City, NJ)

NATIONAL COTTON COUNCIL OF AMERICA
October 2-3 (Chemical Finishing Conference—Statler Hotel, Washington, DC)

PHI PSI FRATERNITY
April 25-27—Annual meeting, New Bedford Hotel, New Bedford, Mass.

PHILADELPHIA TEXTILE INSTITUTE ALUMNI ASSOCIATION
June 6-8 (Alumni Day, Alumni Outing, PTI Commencement)

PURDUE UNIVERSITY
May 13-15 (12th Purdue Industrial Waste Conference, Purdue Univ, Lafayette, Ind)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
May 26-28 (Annual Outing Skytop, Pa); June 11, Sept 10, Oct 8, Nov 12 (Palm Terrace Suite, Hotel Roosevelt, New York, NY)

Proceedings of the
American Association of Textile Chemists and Colorists

Copyright, 1957, American Association of Textile Chemists and Colorists

April 22, 1957

Two Hundred and Sixth Meeting of the COUNCIL

PRESENT and potential uses for "radiochemical techniques in the textile wet-processing industry" will be investigated by AATCC in a new research study which will begin soon under the direction of the Piedmont Section.

Council approved the new study March 29 at its meeting at the Hotel Roanoke, Roanoke, Va, on recommendation of the Executive Committee on Research, and appropriated $2,000 toward the cost of the investigation.

The Piedmont Section's Research Committee, under the chairmanship of Luther B Arnold, Jr, will conduct the study.

* * *

Council also appropriated $2,500 to finance the Textile Education Committee's production of folders and booklets to interest high school students in "Careers in Textile Chemistry."

Henry A Rutherford, chairman of the Textile Education Committee, was authorized by the Publications Committee and by Council to proceed with plans for 50,000 copies of a small folder to stir up interest in textile chemistry as a career, and 5,000 copies of a larger brochure to provide detailed information on college-level textile schools, and industrial opportunities.

* * *

Councilors also heard a report by George P Paine, executive secretary, that Volume 2 of Part I of the *Colour Index* will shortly be available. Copies of this volume, Mr Paine said, would already have been received by AATCC but for a dock-strike in England, which tied up shipments.

It is expected, Mr Paine said, that copies will be received in this country and will be on their way to US subscribers by the end of April.

* * *

Ernest R Kaswell, vice-president, New England region, and 1957 Convention chairman, reported on details of this year's AATCC Convention scheduled for November 14, 15 and 16 in the Statler Hotel, Boston, Mass.

A special feature of the Boston Convention, Mr Kaswell said, will be visits to the AATCC Headquarters offices and laboratory at Lowell Technological Institute. Special trips will be conducted for members attending the Convention, and a trip to Lowell will be included as part of the ladies program. A meeting of the Council is also being arranged at the Institute.

At the exhibition to be held in conjunction with the Convention, Mr Kaswell said, it is planned to have a display showing the work of the several textile colleges. An exhibit by the Archives Committee of AATCC is also planned.

The Convention Committee is also working on plans to provide special honor to the charter members of the AATCC, as another feature of the 1957 meeting, Mr Kaswell reported.

* * *

In another capacity—as chairman of the Howes Contract Committee—Mr Kaswell reported that the Association's contract with the Howes Publishing Co, Inc, publishers of *American Dyestuff Reporter* and the *Technical Manual & Year Book of AATCC,* will be revised.

A gradual rearrangement of new terms, beginning in 1958, will return additional revenue to the Association, with a total of about $27,000 per year being available in 1959.

* * *

Councilors approved the election of 80 senior members, 30 associate members, 7 junior members, 12 transfers to senior membership and 3 corporate members, upon recommendations of the Membership & Local Sections Committee, Weldon G Helmus, chairman.

* * *

A resolution in memory of Walter E Hadley was unanimously voted by the Council. Mr Hadley was the first secretary of AATCC, charter member and honorary member.

* * *

Sidney M Edelstein, chairman of the Archives Committee, reported that a study of the records of AATCC at its Lowell headquarters had been completed by the National Records Management Council, and a report on the status of these records and archives, with recommendations, had been submitted to Association officials.

Dr Edelstein also offered to Council and Section members and Section officers copies of a new "Program of Activities for Sectional Archivists."

Dr Edelstein reported the names of sectional archivists appointed by Section chairmen, and urged each of the Association's 14 sections to make the post of archivist a Section office. The archivist's area of activities, he pointed out, should include both the Section's records and general historical material from industry at large in the Section's area.

* * *

The Association's Publications Committee reported it had authorized William H Cady, editor of the *AATCC Technical Manual and Year Book,* to prepare for the federal government a cross-index of the old prototype and new *Colour Index* numbers of dyestuffs, to be used in future government statistical reports.

* * *

Frederick V Traut, National Convention Committee chairman, reported that dates for the 1961 Convention in Buffalo had been selected. The meetings will be held Thursday, Friday and Saturday, September 28, 29 and 30, according to Bernard Easton, Councilor from the Niagara Frontier Section. (Other Convention dates, from 1957-1960, may be found in the AATCC Calendar.)

* * *

The Book of Proceedings of the Perkin Centennial, containing the text of all the papers presented, is expected to be published by the middle of June,

Raymond W Jacoby, chairman of the Perkin Centennial Committee, reported.

Council discharged Henry F Herrmann as treasurer of the Perkin Centennial, after his audited report was accepted. This showed a balance of $3,543 remaining after the $10,000 loan by the AATCC treasury. Cost of the book, Mr Jacoby said, will be about $24,000, of which about $11,000 is in hand.

Council voted $14,000 from the Convention Fund to cover the remaining cost of the Perkin Centennial Proceedings.

* * *

In other appropriations, a total of $4,800 was voted to the national headquarters office for equipment and supplies and increased administrative expenses; and $1,925 was voted for the purchase of grease wool yarn, to be resold in connection with standard test methods.

* * *

Roland E Derby, treasurer, reported the cash position of the Association was $463,351.42 and that the conversion value of assets had remained constant since his report to the Council on January 18th.

* * *

The invocation at the Council meeting was given by Arthur Thompson, custodian of the Piedmont Section. Mr Thompson was approved by Council as vice-chairman of the national Publicity Committee. J A Doyle, Publicity Committee chairman, reported the names of Section publicity chairmen, who were also approved by Council as members of the national publicity committee.

These are: W H Bass, Jr, F K Burr, J C Cook, A H DeMarco, R K Gagnon, M T Hallinan, W Kramer, H J Leavitt, D S Lyle, R M Marshall, A M Richter.

* * *

Members of the Archives Committee, appointed by Section chairmen, include R C Childs, A J Kelly, W A Nelson, T M Marshall, A R Thompson, H C Chapin, E S Chapin.

* * *

Council also approved other new Committee members, as follows:

Publications Committee: R A Fliegel and L L Heffner.

Colour Index Marketing Committee: J H Hennessey.

Technical Programs: R H Souther, A N Henschel, and F J Rizzo.

Intersectional Contest Committee: W J Crawford.

Conventions: M J Quigley (one-year term).

Inter-Society Relations: R B Hallowell.

Textile Education Committee: S M Cone, Jr, F A Tesi, R W Jacoby, B K Easton, E H Gamble, J Anderson, and H A DesMarais.

* * *

On the recommendation of the President's Advisory Committee, the Council authorized the president to appoint a committee on AATCC employee retirement and pensions and a legal committee to investigate retention of counsel on a continuing basis similar to the Association's arrangement with its auditors, Price Waterhouse and Company.

* * *

The four vice-presidents of the Association, reporting on their activities, concurred on the need for a stronger program to bring back members who have been dropped for nonpayment of dues.

Ernest R Kaswell, Weldon G Helmus, Elliott Morrill and H Gillespie Smith, vice presidents representing the four AATCC regions, reported they will help all they can in bringing back delinquent members.

Said Mr Smith, in making his report, "It is unthinkable that any man could forego affiliation with the organization which is designed to help him make a living."

Using this theme, he said, much can be done to bring back these members.

* * *

George O Linberg, president, presented a gavel with an inscribed silver band to the Association for official use at Council meetings.

* * *

(Details of research activities at the recent meetings in Roanoke will be contained in the Research Newsletter, which will be published in the next issue of *American Dyestuff Reporter*.)

(Copies of the official minutes of this 206th Council meeting will be mailed automatically to Councilors, chairmen of Council Committees and chairmen of Local Sections when they have been prepared by the executive secretary's office. Other Association members may obtain a copy by writing to the executive secretary, American Association of Textile Chemists and Colorists, PO Box 28, Lowell, Mass.)

* * *

ELECTED TO MEMBERSHIP

MARCH 29, 1957

CORPORATE

Benecolors, Inc
Lebanon Woolen Mills
Philadelphia Hosiery Mills

SENIOR

N Adachi
G R Adams
L Ambruster
G S Baird
H F Bjork
T W Blackwell
G H Brown
H Brown
C L Browne
R H Bryden
R C Buck, Jr
R P Carney
G Celikiz
C C Cobb
E M Cohen
E B Cook, Jr
B L Cozette
D L Cragen
L A Dettmer
N E Elsas
V C Ester
F S Foster
F Fridbergs
A T Glenn
W W Graham
W H Gregory
J D Guerrieri
E Gula
J F Harris
S G Hasty
J C Hayes, Jr
A H Howland
P J Hrynko
M L Huckabee
V T D Humphreys
M D Hurwitz
O K Hutchinson
N S Janetos
T Kanaoka
P Klotz
J W Kraushaar
R V Leary
M N Lefkowitz
M S Letourneau
L G Lovin, Jr
P K MacDonald
E G Maynard
E B McMahon
C H Zimmerman
A P Morrill
C L Mullennix
E C Murphy
A F Neister
R H Palmer
M Peacos
J L Pierce
H B Powell
F R Prater, Sr
G E Prime
D A Qualls, Jr
R G Reall
R P Restrepo
Z A Roumas
G N Sandor
A M Scafidi
F H Sexsmith
W F Smith
J D Sterling, Jr
H M Strub, Jr
R L Stultz, Jr
P Surowitz
E E Tabor
R Taylor
G L Tite
M P Underwood
E J Valois
D G VanderVoort
K E Watts
R W Whittle
M Wiener
J E Woody

JUNIOR

A G Bolliger
E E Buisan
W F Dolan, Jr
G T Gallagher
T C Manzolillo, Jr
K M Raab
O C Tierney

ASSOCIATE

R B Acton
J Aida
F D Andruss
A H Balagot
C D Bedell
M L Bell
R L Boynes
W A Coleman
A B Crowell, Jr
L J Davis, Jr
G E Eilbeck
H Frankel
R E Giauque
J D Gilberg
E F Gobel
W K Hancock
W E Haney
K N Hussain
R Johnsen
D E Luther
J H Market
S M Mintzer
R T Mould
V E Schaefer
J G Schoepf
D M Sheehan
S P Tilton
H F Tucker
S A Warshaw
M W Williams

STUDENT

A O Barrette
T R Beaudet
C Chingros
W F English

(concluded on page P296)

Contribution———

LEUCOESTERS OF VAT DYESTUFFS*

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INTRODUCTION

The leucoesters of vat dyes are water-soluble products, which exhaust from neutral or acid baths, depending on the fiber. The color of the original vat dye from which the leucoester is derived is developed on the fiber by oxidizing agents in the presence of acid. Their affinity for various fibers is different. The influence of temperature on the exhaustion also varies with different fibers. By raising the temperature one increases the affinity of the leucoesters for animal fibers, such as wool, but decreases it for cotton.

The leucoesters are best known under the names "Indigosol" of Durand, Huguenin; "Algosol" of General Aniline and Film; and "Anthrasol" of Farbwerke Hoechst. These firms manufacture a complete range. Since the publication of AATCC's Monograph No. 2, "Application of Vat Dyes" in 1953, in which a list of these dyes appears on page 258, several new types have been introduced.

Leucoesters were first manufactured in 1922. According to the invention of Marcel Bader, vat colors undergo a sulfation with chlorosulfonic acid in the presence of pyridine, resulting in the conversion of a hydroxyl derivative to an ester of sulfuric acid. Thus the leuco-derivative of a vat color is made into a relatively stable, water-soluble leucoester. The simplest example is the change of indigo into Indigosol O. (See Figure 1). Soluble Vat Blue O is, therefore, the sodium salt of the disulfated acid ester of leucoindigo. This product is colorless and water-soluble. Similarly, the other leucoesters are disulfated acid esters of the corresponding vat colors.

Exceptions are Soluble Vat Blue IBC, which is the tetraester of Indanthrene Blue B Type (*CI* 1113), and Red IFBB, the tetraester of Indanthrene Red FBB (Pr 296). Durand & Huguenin, in close collaboration with the IG Farbenindustrie, carried out research which resulted in the production of soluble products from a large number of indigoids and anthraquinoid vat dyes. Later investigations of the Scottish Dyes Ltd led to a process of making the esters directly from the vat dyes themselves by carrying out both reduction and esterification in one operation. This paved the way for the introduction of the Soledon dyes of Imperial Chemical Industries.

DISCUSSION

STABILITY———The stability of the unstandardized leucoesters is relatively good and varies with the different types. If oxidation occurs for any reason, as by the action of light or acid fumes in the air, a local decomposition is initiated. Through this decomposition a small amount of free acid is liberated, which again decomposes the next particles until the whole mass is oxidized. To prevent this autodecomposition, the leucoesters are standardized with alkaline salts. These alkaline buffers assure a stability that is sufficient for practical use.

SOLUBILITY ——— The sodium salts of the different leucoesters vary considerably in solubility. Soluble Vat Blue O is very soluble in water; the derivatives of the halogenated indigos are less soluble according to the degree of halogenation. A consideration of the solubility of the leucoesters is of utmost importance, particularly to the printer, because products of lower solubility can cause trouble with some printing methods. For the cotton dyer and especially for the wool dyer, the solubility is sufficient for all application purposes. The soluble vats are merely dissolved in hot water, taking care to prevent boiling, which might result in premature oxidation of the leucoester.

The application of the leucoesters consists of two steps:

1) the dyeing with the leucoesters from alkaline, neutral or acid solutions depending on the material, and

2) the development of the exhausted, padded or printed leucoester in the presence of acid and an oxidizing agent.

The principal characteristic of the soluble vats is their ability to change back to the original dyestuff readily. This regeneration, which is almost quantitative in acid oxidation baths, occurs in a short time. The reaction consists of a splitting of the monosodium salt of sulfuric acid by hydrolysis in the presence of an oxidizing agent, the ketonic groups of the dyestuff being directly restored, and the original dyestuff being at once regenerated.

AFFINITY———Leucoesters have much more affinity for animal fibers, such as wool, than they do for vegetable fibers, such as cotton. Furthermore, the means normally employed by the dyer to control exhaustion have a very different effect on leucoesters when cotton is being dyed than when wool is being dyed. As mentioned before, by raising the temperature one increases the exhaustion of leucoesters for wool but decreases it for cotton. The cotton dyer either must use products of similar substantivity or take special precautions. The wool dyer, on the other hand, can easily minimize differences in affinity. For vegetable fibers, the substantivity of the leucoesters is a most important factor.

The affinity for vegetable fibers of most of the representatives in the

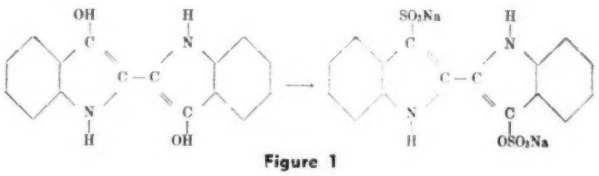

Figure 1

*Presented April 9, 1956 at the Philadelphia Textile Institute as the fifth lecture in the series "The Application of Vat Dyes", which was presented under the sponsorship of the Educational Committee of the Philadelphia Section (now the Delaware Valley Section) of AATCC.

range is low; only a few, like Soluble Vat Green IB, have distinct substantivity. Additions of electrolytes, eg sodium sulfate, sodium nitrite, etc, increase the quantity of dye that can be taken up by the fiber, and the optimum affinity is generally at low temperatures of 75° to 95° F. There are several exceptions, such as Green IB, Brown IBR and Brown I3B. In these cases the optimum substantivity is at 120° F. The types possessing little affinity are best suited for padding or for overprinting reserves. The types with higher substantivity are used mainly for the dyeing of yarns and materials difficult to dye level with vat dyes, especially mercerized cotton.

It is not possible to dye packages of mercerized cotton or rayon level with Indanthrene Blue B type. But the corresponding leucoester, the Blue IBC, is suitable for the purpose. Recently, two new vat dyes of the cold-dyeing type, Vat Blue HCGK and Vat Blue HCRK, have been introduced which can compete with leucoesters on packages because of their extraordinary level-dyeing properties.

SENSITIVITY TO LIGHT——— Many soluble vats are sensitive to light before development. In these cases the ester groups are affected in such a way that the dyes develop prematurely. The actual fastness to light of the developed soluble vat however, has no relation to this sensitivity of the ester.

Light can have an effect on the leucoester in powder or paste form, on the dyestuffs in solution, or on the dyeings before developing, during dyeing, and after dyeing and drying. A change of the first type is usually limited to an outer layer of the powder or paste. The oxidized part becomes water insoluble, resulting in a small loss of color value. Solutions which are subjected to light oxidize gradually. Colorless solutions become darker as the intensity of the light and the time of exposure is increased. The reoxidized vat dyestuff stays in a colloidal state for a while, but precipitates eventually. Since sulfuric acid is generated during the oxidation, the rate of decomposition increases with increase of time, especially if such solutions contain sodium nitrite. During dyeing on the jig, the selvages of the cloth exposed to light may be darker than the rest of the cloth, because additional leucoester is absorbed at the parts where the dyestuff is prematurely oxidized.

In order to avoid all difficulties which may occur through the action of light, it is advisable to reduce exposure to a minimum. This can be done in a plant by painting the windows with a mixture of lime and Ultramarine Blue. The solutions and also the undeveloped dyeings of leucoesters derived from indigoids or thioindigoids are especially sensitive to light. However, under normal conditions they are not easily developed. Therefore, no relation exists between the sensitivity to light and the ease of oxidation under normal conditions.

There are some cases where the undeveloped leucoester was used in the same way as a sensitive photographic paper. Anthrasol Pink IR, Anthrasol 04G, Anthrasol Brown IRRD and Anthrasol Blue Black IRD have been used as paddings on cotton in place of a photographic paper. Where the dyestuff is developed by light, it is fast to washing. The unexposed part can be washed off with alkali since the leucoesters do not have much affinity on vegetable fibers before oxidation. Such a picture of vat dyes on cotton is therefore fast to light and washing. When you repeat the same on wool, leather or silk you will obtain the same picture, but it is not possible to wash out the unexposed dye since leucoesters are fixed on animal fibers before oxidation.

EASE OF REGENERATION——— The ease of regeneration of the leucoester to the original dyestuff is the most valuable property of this group. The potential of the oxidizing medium depends upon the choice of the oxidizing agent (ferric salts, copper salts, nitrous acid, chromic acid, peroxides, peracids, etc), upon the temperature at which the oxidizing is carried out, and upon its pH value. Different soluble vats have different reduction potentials; the oxidizability of the leucoesters increases with the molecular weight and with the number of substituent groups of positive character. Thus, Green IB and Olive Green IB are easy to oxidize because of their high molecular weight combined with positive imino groups. An exception is Blue O, which is easily oxidized despite its low molecular weight. This is due to the strong positive indol-NH groups. Oxidation can be retarded by the introduction of negative halogen, as in the case of Blue 04B or 06B.

CARE IN DEVELOPING———The different reduction potentials have to be taken into consideration by the printer and the dyer. Excess oxidizing agent may cause the developed dye to be attacked. For example, Blue O, OR, IBC, Printing Black IB and Olive Green IB are particularly sensitive to overoxidation. The effects caused by overoxidation of the indigoid derivatives are easily explained when it is recalled that the indigo itself is easily oxidized to soluble isatin. If the oxidation progresses too rapidly, part of the indigo is converted into isatin and the dyeing becomes greener and duller.

Blue IBC shows the same result on excessive oxidation as may be observed in dyeing with the corresponding Indanthrene Blue BCSA when the oxidation takes place in an alkaline leuco compound. The dyeing turns greener and duller and the yellowsh-green azine is formed from the blue N-dihydro-1:2:1′:2′-anthraquinone azine.

Since nitrous acid is the main oxidizing agent used, it has to be remembered that soluble vats containing amino or imino groups may show deviations in shade owing to the formation of diazo- or nitroso compounds. Therefore, the developing operation should be carried out as delicately as possible in the cases of soluble vats, which are susceptible to changes of this kind.

The best way to counteract overoxidation is by an addition of thiourea. Urea and protective colloids derived from cellulose waste liquor can also be used. They are, however, not as effective as thiourea.

USES AND APPLICATION PROCEDURES———The leucoesters are used for light and medium shades. Their most important advantage is the uniformity and levelness of the dyeing. Piece goods can be dyed with them on the jig and in the beck, but their main field of use is on the pad. Leucoesters are excellently suited for continuous dyeing because of their low substantivity on cotton. To keep the affinity as low as possible, the padding is done best at 175° to 190° F. We have explained before that the exhaustion on cotton is lower at higher temperature. Therefore, this procedure is logical. At the same time, the speed should be kept as high as the quality of the goods permits. In spite of this, it is not always possible to eliminate the effects of substantivity completely. The feeding additions are thus often more concentrated than the initial padding solution. To make additions easier, the soluble vats have been divided into five groups. If possible, products of the same group should be used together. If that is not feasible, the per-

cent exhaustion of the single product has to be taken into consideration. These groups can be found in pattern cards and handbooks.

While these tables provide the possibility of correct calculations, it is not easy to find immediately the correct proportions for the starting bath and feeding liquors.

A small-size impregnating trough should be used to produce quickly a standard shade by the continuous process. It is best to use a specially constructed padder in which the goods are conveyed directly to a two-roll pad, both rollers being rubber and not covered.

In order to insure proper penetration and uniformity of back and face, the lower roller dips into a trough of the pad liquor, while the pad liquor is also discharged through a perforated pipe at the nip and on the roller, thus building up a dam before the nip. In this manner the cloth is continuously regenerated with the feeding tank liquor. This eliminates any variation in strength and shade due to the substantivity of the single components, without reinforcing the feeding liquor.

NITRITE PROCESS———The main process used for dyeing with the leucoesters is the nitrite process. The goods are impregnated with a mixture of the soluble vat and sodium nitrite, followed by a treatment with sulfuric acid. A typical pad liquor contains the dyestuff, one ounce of wetting agent of the alkylnaphthalene sulfonate type, and one ounce of soda ash for every seven gallons of pad liquor. The amount of nitrite varies with the amount and the different types of leucoesters. Usually 3/4 to 2¼ ozs of nitrite per gallon are necessary. For heavy fabrics or some mixed fabrics, it is also advisable to add some gum tragacanth to increase the viscosity of the pad liquor. The padding is usually followed by a short skying.

When leucoesters of little substantivity are used, the material should be dried between padding and developing. Soluble vats of higher substantivity are already firmly fixed. They are not removed from the fiber when they enter the developing bath. For the substantive leucoesters, drying is therefore unnecessary. When less substantive types are not dried before developing, they bleed into the developing liquor, especially if the product is not easily oxidized. This can result in dyeings with less fastness to crocking. Drying is mainly recommended for rayon. When intermediate drying is carried out, the amount of nitrite in the pad liquor can be cut by ¼ to 1/3. Drying is preferably carried out in the hot flue.

It is advisable to develop the impregnated material as quickly as possible. In case the development is not carried out continuously, the goods can be kept for a short time in a rolled-up state, provided the material is not so wet that migration occurs. Furthermore, care must be taken that the material does not dry partially and that it is protected against acid fumes and light. The development can be postponed for a longer time only if the material is dried and is protected from light.

The development is carried out in a 2% solution of sulfuric acid (by volume) at 120° to 160° F. The time of development is 3 to 5 seconds, followed by an air passage of 15 to 20 seconds.

The names of the soluble vats that are easy to develop can be found in handbooks.

For obvious reasons, it is difficult to keep the developing bath at a constant composition. When wet goods are developed, much water is carried into the acid bath by the goods so that the liquor is diluted; dilution of the acid results in slower development and may result in weaker dyeings. In addition, nitrous acid is formed in the sulfuric acid bath and becomes more concentrated as the continuous developing process progresses. This increase in nitrous acid content of the bath causes overoxidation. Therefore, a constant composition of the developing bath is essential for the production of satisfactory dyeings.

To minimize these difficulties, special machinery has been designed for the developing bath. One of the best is a V-shaped tank, baffled in such a way that it holds only about 2 to 4 gallons of liquor. The developing bath is made up in a feeding tank and flows through a narrow slot in the same direction as the goods. The goods are not squeezed off thus enabling the bath to be continually replenished.

JIG DYEING———Dyeing on the jig is next in importance to continuous piece dyeing. The jig is favored if small batches are to be dyed in mode shades. Dyeing to shade in the continuous machine requires preliminary tests, but matching on the jig can be done without great difficulty. Even with the less substantive soluble vats, jig dyeing can be carried out economically and, owing to the good solubility of the soluble vats, it can be done in the smallest liquor ratio, namely 1:3 to 1:5.

It is advisable to develop leucoesters dyed on the jig in the same type of trough described in connection with the continuous process. If no open-width washing machine is available, the developing trough is best placed between two jigs and the goods run from the impregnating jig through the developing trough into the rinsing jig. If a developing trough is not available, developing is done on the jig itself. In this case it is better to use two or three jigs, one of them serving as a developing trough. If, however, both dyeing and developing have to be done on the same jig, it is advisable to avoid the use of those leucoesters which are difficult to develop, since the high sulfuric acid concentration required might damage the material during prolonged treatment on this machine.

In addition to the sodium nitrite, the dyebath contains also sodium sulfate to help the exhaustion of the soluble vats.

A typical bath in the jig, which should have a liquor ratio of 1:3 to 1:5, contains half the dyestuff and one oz of soda ash for every seven gallons of liquor. After the first passage the other half of the dyestuff is added. After the second end, half the amount of the salt, and after the third end, the rest of the salt is added to the dyebath. The amount of salt varies for different leucoesters. Matching can be done after four ends. A swatch is treated for 1 to 2 minutes at 70° F or higher, if the colors require it, in a bath containing 35 ozs of sulfuric acid and one oz sodium nitrite per seven gallons. The swatch is rinsed and boiled in soap for at least two minutes.

If the material is difficult to penetrate, an acid-resistant wetting agent can be added. If it is desirable to exhaust the soluble vat slowly, as in the case of materials which cannot easily be dyed level, the starting temperature can be raised to 100° to 140° F. since the exhaustion of soluble vats is in general greater at lower temperature, they will gradually exhaust as the bath cools down.

When leucoesters that are sensitive to overoxidation are used, the temperature of the developing bath should not exceed 70° F. If, for any reason, the developing bath is higher than this temperature, an addition of urea or thiourea is recommended. Development is usually completed after two ends.

Finally the material should be rinsed and neutralized with one oz of soda ash for every three gallons at 140° F. After two ends, the goods

are soaped the same way as vat dyeings.

BECK DYEING ——— Knitted goods, crepes and other special materials which cannot be handled in the open width may be dyed in the beck. Dyeing is usually carried out in the presence of a protective colloid of the alkylaromatic sulfonate type, which keeps oxidized particles in suspension, thus avoiding blotches.

The dyebath contains, furthermore, an acid-resisting wetting agent of the alkylnaphthalene sulfonate type. The dyestuff is added slowly at 100° to 115° F. One to three ounces of sodium sulfate per 10 gallons are added in portions to help the exhaustion. One-half to three-quarters ounce of sodium nitrite per 10 gallons is added during dyeing. The temperature of the dyebath is gradually dropped to 85° to 95° F. Finally the sulfuric acid required for developing is fed to the exhausted dyebath. This working method has been used to advantage for soluble vats of medium and high substantivity. This single-bath method is preferred because it is difficult to rinse or extract the goods.

In the case of Soluble Vat Blue IBC, which has an extremely low substantivity and, therefore, is not particularly suitable for the one-bath method described, another one-bath process has been suggested. This dye is a tetraester of leuco-Indanthrene Blue B, which is yellow. Two of the ester groups are easily eliminated in a very weak acid bath with formation of the less soluble, but high substantive, violet-colored ester. Blue IBC, therefore, is dyed best with an addition of ammonium acetate, which, on the one hand, liberates acetic acid to initiate the reaction, and, on the other hand, buffers the sulfuric acid which is formed subsequently and thus prevents too rapid hydrolysis of the ester. This working method has proven quite satisfactory.

The amount of salt varies for different types, as previously mentioned. The maximum amounts of sodium sulfate can be determined from tables in pattern cards and handbooks. Such tables will also furnish the percent exhaustion for different products when the same amount of salt is used.

PASTEL SHADES———Because of their excellent penetration of cotton and linen yarn, the leucoesters are often preferred to the regular vat dyestuffs. On rayon and Bemberg rayon it is easier to obtain level dyeings with leucoesters than with vat colors when the production of pastel shades is desired. For pastel shades the one-bath method is preferred, because it is faster and simpler. The dyeing is carried out in package or cascade machines in the presence of one pound of a dispersing agent and 8 ounces of sodium nitrite, separately dissolved. The dyeing is started at 140° F. After several minutes, additions of salt are made in several portions. The quantity of salt varies with the substantivity of the leucoester. For various depths of shade different amounts of Glauber's salt are used.

Instructions concerning the amounts of salt can be found in pattern cards and handbooks.

The sodium nitrite can also be added with the last addition of sodium sulfate instead of at the beginning of the dyeing operation. During 1-hour dyeing, the temperature gradually drops to about 120° F while the exhaustion increases. Then 2 quarts of concentrated sulfuric acid, 66° Bé, diluted with water (1:4), are added slowly to the dyebath. Development starts immediately and is completed after about 10 minutes. The developed goods are rinsed, neutralized, and soaped thoroughly at the boil to remove loose pigment.

FULL AND BRIGHT SHADES ———In the case of full and bright shades, the two-bath method must be used. The bath is started at about 140° F with a leveling and penetrating agent, eg, Igepon T Gel. The soluble vats are dissolved with hot water and half this solution is added to the dyebath. After several minutes the balance of the dyestuff is added. Then, gradually, the requisite amount of sodium sulfate or common salt is fed into the dyebath. When the required degree of exhaustion has been attained, the bath is dropped, but the goods are not rinsed.

Development is carried out immediately for 15 to 20 minutes at 75° F to 85° F in a fresh bath containing one gallon of concentrated sulfuric acid and 12 to 16 ounces of sodium nitrite, calculated on 100 gallons of liquor. The developed goods are rinsed, neutralized with 2% soda ash on the dry weight of the fiber, rinsed again and then soaped at the boil.

PACKAGE MACHINES——— Yarns can also be dyed very well on package machines. The dyeing is preferably carried out according to the aforementioned one-bath method. The dyeing is especially suited for mercerized cotton yarn or rayon yarn of higher affinity, as a good penetration of packages can be obtained. The starting temperature is usually high to allow a slow exhaust. The bath contains a wetting agent and a dispersing agent of the alkylaromatic sulfonate type. The liquor is circulated for about 10 to 15 minutes. Then the salt additions are made gradually, and with the last feeding of salt the necessary amount of sodium nitrite is added. The sodium nitrite addition varies with the depth of shade from 1/4 ounce for pastel shades up to one ounce per gallon for heavy shades. The dyeing is completed after one hour. The liquor is dropped.

For heavier shades it is advisable to extract the packages, before development is carried out for 10 to 15 minutes at 75° to 160° F, according to the dyestuff used. After developing, the packages are rinsed, neutralized and soaped.

DYEING OF WOOL———In their dyeing behavior toward wool, the soluble vats resemble the acid dyes considerably. For example, the rate of exhaustion is increased by the addition of acid and an increase in temperature. In the use of acid for the exhaustion of leucoesters on wool, the kind and the amount of acid must be given careful consideration to avoid unlevelness, just as with acid dyestuffs. Since the soluble vats behave like acid dyes, they are fixed on the fiber chemically and possess good fastness to washing on wool, even in their colorless leuco state. This thorough fixation is probably the reason that leucoesters are much more difficult to oxidize on wool than on cotton.

It is known that the soluble vats are very sensitive to acid. Nevertheless, Soluble Vat Blue O can be boiled with mineral acid in the presence of wool. The reason is that most of the dyestuff is exhausted and fixed on the wool shortly after the boiling point is reached, and as soon as the dyestuff is engaged by the wool, oxidation is retarded.

Dyeing with Soluble Vat Blue O should be carried out with sodium sulfate, sulfoxylate, formic acid or sulfuric acid. It is wrong to use acetic acid first and then to exhaust the bath with sulfuric acid. Acetic acid exhausts the bath incompletely, only to about 60%. When sulfuric acid is added at a high temperature, the rest of the dye exhausts so rapidly that an uneven dyeing may be obtained.

Soluble Vat Blue O and OR are developed on wool with sodium nitrite and sulfuric acid at room temperature. While leucoesters develop on cotton within a few seconds, the oxidation on

wool is relatively slow. During the war, many thousand pieces of flannel and melton were dyed for the Navy, using as a base 5% Blue O, dyed with 3% sulfuric or formic acid for one hour at the boil, developed cold with 1.2% sodium nitrite and 14 oz of sulfuric acid for every ten gallons of liquor. It was, therefore, advantageous to use a full machine, which gives about 20% of sulfuric acid calculated on the wool.

Anthrasol O is colorless. Since it is exposed to air and steam during dyeing over the reel, 0.5 to 1% of a sulfoxylate. such as Rongalite, is added to the dyebath. Rongalite has reducing action above 160° F and prevents premature oxidation, that leads to inferior crocking fastness. The wool should have a creamy shade during the dyeing.

The base of Blue O was topped with chrome colors to match the Navy standard. Because of the indigo base, the dyeings had the characteristic greenish overhand. A newer development makes it possible to eliminate topping with chrome dyes by using Indigosol Brilliant Violet 14R as a shading color. This one-bath method is time saving and therefore cheaper for the production of the Navy standard. The other leucoesters exhaust with very little acetic acid. As a matter of fact, many of them exhaust completely at a pH of 7. All anthraquinone types of high molecular weight show a very good exhaustion at the neutral point. The indigoids show less exhaustion, but with increasing introduction of negative halogen atoms in the molecule the indigoids and thioindigoids exhaust faster. If, therefore, Golden Yellow IGK is brominated, Golden Yellow IRK with better exhausting properties is obtained.

Generally speaking, leucoesters are dyed on wool like milling dyes, using 2-5% ammonium sulfate. Glauber's salt retards the exhaustion and is, therefore, recommended. While they level better than the typical milling type, the dyeing of piece goods is difficult. An indigoid type, such as Blue 04B, exhausts quite rapidly in the presence of ammonium sulfate, distinctly faster than an anthraquinone derivate such as Red IFBB. The exhaustion of Blue 04B can be retarded by ammonia, while Red IFBB is not influenced by ammonia. In the presence of ammonia, indigoids with an originally greater strike will exhaust slower, approximately at the same rate as anthraquinone derivatives exhaust. The only perfect leveling Blue is Anthrasol Blue AGG. This product boils on and off like a level dyeing acid color. This is our light standard No. 8.

In practice, it is usually unnecessary to exhaust the bath by addition of acid. For reasons of economy, most shades dyed with leucoesters are light or medium shades, and in these cases exhaustion occurs with ammonium sulfate, or in pastel shades even in a neutral bath.

Exhaustion can be checked with sulfuric acid and sodium nitrite. Any dyestuff which is left in the bath will color the liquor immediately and precipitate after a while.

The development on wool quite generally is carried out with sodium bichromate in the presence of sulfuric acid. The minimum amount of bichromate should be 0.7%, and the maximum 3% owf. For baby blues and pinks, the bichromate can be reduced to 0.5%.

Ammonium thiocyanate is used to prevent overoxidation of the leucoester. This compound forms complex salts with chromium, which seems to control the oxidizing action on the soluble vats. Furthermore, the compound prevents an excessive deposit of chrome oxide on the fiber. The buffering action of the ammonium thiocyanate is also important. If this product is not added to the developing bath, most shades will come out considerably duller. In most cases, 1% of ammonium thiocyanate is needed; for heavier shades 2%, and in extreme cases 3%, on the weight of the wool is required. Since the oxidation potential is at its maximum at a low pH, sulfuric acid is used in the amount of 13 ozs per 10 gallons of water (10 g per liter).

The developing bath is prepared by adding the acid, the bichromate and the ammonium thiocyanate in the order mentioned. The developing bath should be started lukewarm, and the temperature raised to 180° or 190° F in 30 minutes; the bath is then kept for 30 minutes at about 185° F. Finally the dyeing is rinsed and neutralized cold with 2% soda ash, on the weight of the wool, which results in a pH of about 5.

Phosphoric acid develops most leucoesters in the presence of bichromate, but the resulting shades are usually duller, just as the prosphoric-acid esters of the leuco compounds as such are duller than the sulfuric-acid esters. However, for men's-wear shades, this is of no importance and phosphoric acid is being used successfully. When this acid is used, the bath needs to be cooled down only to 160° or 170° F as the development does not start below 170° F. Since the bath is usually completely exhausted, the application of phosphoric acid can be considered a time saver. Furthermore, the corrosion of stainless steel is eliminated with the use of phosphoric acid.

Good results are also obtained with sulfamic acid ($HO\text{-}SO_2\text{-}NH_2$). Since this acid is commercially available in crystalline form, which dissolves readily in water, the danger of workmen being burned is practically eliminated. Stainless steel shows less than one-fifth as much corrosion with sulfamic acid as with sulfuric acid.

Since the leucoesters exhaust completely on wool during a regular dyeing operation, a once-established shade can always be reproduced if the wool is the same. Matching a single lot to shade, is not easy, however. A sample is taken after 30 minutes boil and submitted to a quick development for 5 minutes at 195° F with sulfuric acid and ammonium sulfocyanide and higher amounts of bichromate which can be determined from pattern cards. Additions of dye should not be made above 180°, and the bath should be neutralized with ammonia.

DYEING OF UNION GOODS——

Leucoesters can be used to advantage on union goods. They can be used in such a way that the cotton or rayon is left white and also used for tone-in-tone dyeings.

The rayon white method has been used for sport shirts of 80% rayon and 20% wool. Selected leucoesters are dyed at the boil in the presence of ammonium sulfate or acetic acid, simply omitting Glauber's salt. It is important that the salt be omitted otherwise the rayon will be stained.

It is worthwhile to mention how perfectly the complete exhaustion of the leucoesters can be utilized. All matches which were produced on 5-g pieces in the laboratory were taken by the dyer in the mill without any changes and were dyed on a set of pieces, and in each case the exact shade was obtained without making any additions. This may sound unbelievable, but since the material contains only 20% of wool a strength difference of 10% is not perceptible.

Different dyeing methods have been developed to obtain tone-in-tone dyeings on unions. One method, worked out by Farbwerke Hoechst, is based on a pad-steam process, which makes use of the fact that sodium chlorate oxidizes Anthrasols in the presence of neutral steam. It is very important that the pad liquor has a temperature of 150° F and the immersion time is from 7-10 seconds; otherwise different fibers will absorb the liquor

to a different degree, resulting in skittery dyeings.

The goods which may contain wool and cotton or wool and rayon are padded, dried in a hotflue, developed in an ager, and then washed continuously. A two- or three-roll padder can be used, a three-roll with 2 dips and 2 nips being preferable, since the immersion time should be at least seven seconds. The retention should be 90-100%.

The composition of the pad liquor is similar to a print paste. The Anthrasols are pasted up with

40 grams of Glycine A and
100 cc of hot water; then
50 grams of gum trag 60:100 made slightly alkaline with ammonia are added, and
500 cc of hot water are mixed in. Let the bath cool to 170 F and add
80 cc ammonium thiocyanate 1:1,
80 cc of sodium chlorate 1:2,
10 cc of ammonium vanadate 1:100, and
2 grams of a good wetting agent.

The whole mixture is passed through a screen and adjusted to

1 liter.

The drying should not be done above 170° so as to prevent premature oxidation of the leucoesters and yellowing of the wool. In case the dried material cannot be developed immediately, it should be protected from direct sunlight as well as acid fumes. Development is carried out in the Mather-Platt or ager. If an ager is not available a star-steamer can be used.

The developed goods are washed with a product such as Igepon T in the presence of a little acetic acid at about 180—190° F for a few minutes and then rinsed.

Matching to shade is done the same way as the printer does it. For instance, one yard of the material can be run through the procedure with the same squeezing effect and at the same speed.

The Anthrasols suitable for this procedure are:

Printing Yellow I3G
Golden Yellow IRK
Orange HR
Red IFBB
Grey IT
Brown IBR
Olive Green IBB
Olive Green IB
Green IGG
Green IB
Blue IBC
Brilliant Violet I4R

From this it is evident that leucoesters derived from indigoids cannot be used for the process.

Any other union fabric can be dyed in this fashion: sport shirtings, Palm Beach cloth, heavy fabrics for automobile upholstery.

The process is also suitable for all wool materials. Indigoids should be applicable on a padder too, even if the development should have to be carried out a different way.

DYEING ON SILK———Leucoesters can be dyed on silk in a manner similar to that for wool, but they can also be applied continuously. The pad liquor has to be short so as to eliminate the different strikes. Sodium nitrite is added to the pad liquor, about ½ ounce per gallon on the average. The development is carried out continuously by a passage of 2 to 3 seconds through a 2% solution of sulfuric acid at 120° to 140° F according to the dyestuffs used, followed by an air passage of 20 to 30 seconds. After oxidation is complete, the pieces are rinsed, neutralized with ammonia and soaped at 180° to 200° F

DYEING ON NYLON———Leucoesters can be used on nylon. They exhaust similar to acid dyes. Adsorption is limited and the fastness to light with many types is rather disappointing. The fastness to light can be improved in many cases by steaming. Since the procedure forms aggregates of dye on the surface of the fiber the fastness to crocking may be impaired.

DYEING ON DACRON———Leucoesters may be used for the production of pastel shades on Dacron. The goods are padded, dried and heat-set at 350°F for 40-60 seconds. Depending on the method, the shade is either developed during or after heat-setting.

DYEING ON ORLON———Bright shades can be produced with leucoesters on Orlon piece goods by the conventional nitrite methods which yield good fastness to light but only fair fastness to washing and crocking.

Leucoesters, in particular Anthrasol O, can be used to advantage for the dyeing of wool in mixtures with Dacron and wool or Orlon and wool. Dyestuffs used for Dacron and Orlon dye in such mixtures also the wool and tedious scouring processes are necessary to clean the wool from disperse or basic types which interfere with the required fastness properties. However, when the wool in such mixtures is dyed with leucoesters in the presence of Rongalite, the undesired dye is stripped from the wool while it is dyed simultaneously with leucoesters.

AATCC Calendar

COUNCIL

June 7 (Hotel Statler, New York)

NATIONAL CONVENTIONS

Nov 14-16, 1957 (Hotel Statler, Boston); Oct 30-Nov 2, 1958 (Hotel Conrad Hilton, Chicago); 1959 (Sheraton Park and Shoreham Hotels, Washington, D C); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa.); September 28-30, 1961 (Buffalo, NY)

DELAWARE VALLEY SECTION

May 24 (Outing—Torresdale-Frankford Country Club, Philadelphia, Pa); Sept 27 (Joint meeting with New York Section at Trenton, NJ); Nov 1 (Sheraton Hotel, Philadelphia, Pa); Dec 6 (Kugler's Restaurant, Philadelphia, Pa)

HUDSON-MOHAWK SECTION

May 17 (Ladies Nite—Schuyler Meadows, Albany, NY); June 21 (Outing—Antlers Country Club, Amsterdam, NY)

MID-WEST SECTION

April 27 (Netherland Hilton Hotel, Cincinnati, O); June 14-15 (Outing—Brown's Lake Resort, Burlington, Wis); October 26 (Bismarck Hotel, Chicago, Ill)

NEW YORY SECTION

Apr 26 (Kohler's Swiss Chalet, Rochelle Park, NJ); May 24 (Ladies night—Kohler's Swiss Chalet); June 21 (Outing—North Jersey Country Club, Wayne Twsp, NJ); Sept 27 (Joint meeting with Delaware Valley Section at Trenton, NJ)

NORTHERN NEW ENGLAND SECTION

May 10 (Lowell Tech Inst, Lowell, Mass); Sept 13 (Outing—Wachusett Country Club, W Bolyston, Mass); Dec 6 (Annual meeting, Hotel Continental, Cambridge, Mass)

PIEDMONT SECTION

June 7-9 (Outing—Mayview Manor, Blowing Rock, NC); Sept 28 (Hotel Barringer, Charlotte, NC)

RHODE ISLAND SECTION

Apr 25 (Student Night—New Bedford ITT, New Bedford, Mass); June 14 (Outing—Warwick CC and Rocky Point, RI); Sept 27 (Ladies Night—Narragansett Hotel, Providence, RI); Oct 24 (Providence Engineering Society, Providence, RI); Dec 5 (Annual Meeting—Johnson's Hummocks Grill, Providence, RI)

SOUTH CENTRAL SECTION

Apr 27 (Hotel Patton, Chattanooga, Tenn); June 21-22 (Outing—Lookout Mtn, Tenn); Sept 20 (Hotel Patton)

SOUTHEASTERN SECTION

June 7-9 (Outing—Radium Springs, Ga.); Sept 14 (Harmony Club, Columbus, Ga); Dec 7 (Dinkler Plaza Hotel, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION

May 17 (Ladies Night—Rapp's Paradise Inn, Ansonia, Conn); June 14 (Outing—Wallingford, Conn); Sept 27 (Rapp's Restaurant, Shelton, Conn); Nov 1 (Annual meeting, Hartford, Conn, area); Dec 13 (Rapp's Restaurant, Shelton, Conn)

Activities of the Local Sections

Piedmont

THE 1957 Spring Meeting of the Piedmont Section was held March 30 at the Hotel Roanoke, Roanoke, Va, with a total registration of 241. The meeting climaxed meetings of AATCC national committees, the Council and Technical Committee on Research, which were held on Thursday and Friday, March 28-29 in Roanoke.

The Section's Research Committee met on Saturday morning.

Visitors to the Section's Officers Luncheon at noon were AATCC president George O Linberg and George P. Paine, executive secretary-assistant treasurer of the Association.

At the afternoon technical session, I A Berstein, Tracerlab, Inc, spoke on "Applications of Radioactivity in the Textile Industry". This was followed by a special meeting of the Technical Committee on Research, under the chairmanship of Charles A Sylvester, E I du Pont de Nemours & Co, Inc, chairman of TCR. This meeting, which was open to all attending, was designed to better acquaint the Section with the functioning of TCR. The TCR phase of the program featured introductory remarks by President Linberg and Harold W Stiegler, AATCC's director of research, after which chairmen of selected TCR subcommittees of special interest to the South presented reports on the activities of their respective committees. George S. Wham, Good Housekeeping Institute, spoke for the Wash and Wear Committee; Ralph B Smith, New Jersey Laundry and Drycleaning Institute, "Colorfastness to Washing"; Joseph E Norton, Atlas Electric Devices Co, "Colorfastness to Washing"; and Richard F Aurich, Joseph Bancroft & Sons Co, "Damage Caused by Retained Chlorine". P J Fynn, J C Penney Co, spoke on the absence of John H Warner, D B Fuller & Co, on the subject "Dimensional Changes in Textile Fabrics".

The evening banquet, which attracted 179, featured Dave Morrah, noted author and cartoonist, who spoke on "Humor in Industry".

* * *

THE 1957 Winter Meeting of the Piedmont Section was held January 7, at the Hotel Poinsett, Greenville, S C.

The Research Committee met in the morning, at which time reports were made by the heads of the various subcommittees. The Officer's Luncheon was held at noon, and the Section was honored by the presence of the AATCC president, George Linberg, who spoke briefly on the various activities of the Section.

The textile industry has "a big job of public relations to do both inside and outside our industry to regain the recognition we have lost," Mr Linberg declared.

Mr Linberg, vice-president of Synthron, Inc, Ashton, RI, in his first public address as AATCC president, stated: "We have a long way to go to catch up with electronics and plastics —to name only two of the progressive industries. I think the reason we are lagging behind is that we have not done much about it."

"The shift of the center of gravity of the textile industry to the South", Mr Linberg said, "has placed increasing responsibilities on your shoulders for projecting Association policy. Much of our future is dependent on your imagination and vision. . . . You have taken the leadership in the Textile Education Committee (of AATCC). This activity is vital to our industry and to our Association."

"I am hopeful," Mr Linberg said further, "that our Association can make a real contribution to awaken a consciousness of both high school students and their parents of the many fine opportunities in our industry."

Speaking specifically of the position of the Piedmont Section, Mr Linberg said:

"This is one of the Sections where I feel most at home. My first boss was Dr Elvin Killheffer who, as you all know, was the first secretary of this Section when it was organized under the name of the Southern Section on September 26, 1924. You are distinguished as the first section to be formed in the South, and over the past 33 years you have held a place of influence in shaping our Association. I will look to you during my term of office for much help and guidance."

In the afternoon, two papers were given at the technical session: "The Chemnyle Story," by W H Hindle, The Chemstrand Corporation, and "Measurement of Dextrinizing Enzymatic Activity in Desizing Agents," by M M Weber, Pabst Brewing Co.

A social hour was held before the banquet at which A H Ward, Clemson College, spoke on "The Pursuit of Happiness."

The registered attendance at the meeting was 244, and at the banquet, 158.

Northern New England

THE Northern New England Section, at a meeting held March 1st at the Hotel Vendome, Boston, Mass, heard Robert E Ritter, technical service representative in the Fibers Department of E I du Pont de Nemours & Co, Inc, speak on the subject "The Theory and Practice of Heat Setting Dacron Polyester Fiber—Thermal Shock Unit".

The next meeting of the Section will be held May 10 at the Lowell Technological Institute, Lowell, Mass, in conjunction with the LTI Student Chapter.

* * *

THE Lowell Technological Institute Student Chapter will host the "parent" Northern New England Section May 10th at the Institute with its most ambitious and attractive program to date.

Tours of the Institute are scheduled for 3 to 4:30 pm, after which a forum meeting will be held, beginning 4:30 pm, in Room PL-321, Olney Hall. The forum will have as its subject, "Textile Education", with Anthony J Villani serving as moderator. Senior panelists, each of whom will discuss the subject for ten minutes, will include: Charles F Edlund, dean of faculty at LTI; John H Skinkle, professor of textile chemistry at LTI; Richard D Wells, Fabric Research Laboratories, Inc; and Arthur T Hartford, Jr, E I du Pont de Nemours & Co, Inc. Questions will be asked of the senior panelists by a student panel consisting of Louis Port, Robert H Keenan, Vernon H Ure and John Santos.

Dinner will be held in the Cafeteria at 6:30 pm, after which the group will adjourn to Eames Hall Lounge for the evening program, which will be under the chairmanship of Leonard T Coppeta.

The evening program will feature the following presentations: "Dyeing of Hydrophobic Fibers" — Part I, Alan A Denio; Part II — Therese Polak; "A Dyeing Study of Jute", Edward Landy; "The Effect of Certain Acid Dye Structures on the Rate of Wool Dyeing"—Edward W Makuch.

Mid-West

THE Mid-West Section will hold its annual Spring meeting this Saturday, April 27 at the Netherland Hilton Hotel, Cincinnati, Ohio.

Following the regular business meeting at 3 pm, John T Taylor, Rohm & Haas Co, Philadelphia, Pa, will speak on the subject, "Manufacture of Non-Woven Fabrics". In his talk, Mr Taylor will cover the many techniques, properties, and potentialities of this relatively new member of the textile family.

Guest speaker at the evening session, following dinner, will be Norman R S Hollies, Harris Research Laboratories, Inc, Washington, DC, who will discuss "Comfort in Clothing".

Mid-West Section committee appointments for 1957 have been announced as follows:

Intersectional Contest—Lee G Johnston, American Institute of Laundering

Scholarship—Eric W Camp, National Aniline Div, *chairman;* Joseph H Jones, Phoenix Dye Works; L B MacFarland, American Aniline Products, Inc; and Arthur I Hultberg, Bear Brand Hosiery

Outing—George B Chabot, Jr, American Cyanamid Co; Raymond L Burnett, E I du Pont de Nemours & Co, Inc; Raymond D Totten; Robert R Blank, Shorewood Mills; Gerald L Frericks, Monroe Chemical Co; William H Bultman, The Best Foods, Inc; Victor Shutz, Phoenix Hosiery Co; Chester J Kurowski, Mid-West Processors, Inc; William D Paine, General Dyestuff Co; Arthur J Raynor, Jr, Becco Chemical Div; Archie G Alexander, Arkansas Co, Inc; Otto H Grulke, Coopers, Inc; George B Willgeroth, Chemical Products Co

Program—Frank S Stover, American Aniline Products, Inc, *chairman;* Kenneth J Giese, Chippewa Falls Woolen Mill Co; David A Anderson, Phoenix Trimming Co; Edwin I Stearns, American Cyanamid Co

Publicity—Frank H Gurry, Aurora Bleachery, Inc

New York

THE New York Section will hold its 1957 outing on June 21 at the North Jersey Country Club, Wayne Township, NJ.

Washington

FOR their Spring meeting on Friday, April 26, members of the Washington Section will be the guests of the National Institute of Drycleaning, Silver Spring, Md. A technical program on the uses, manufacture, and characteristics of synthetic fur fabrics has been arranged.

John P Malik, assistant to the president, Borg Fabric Division, George W Borg Co, will discuss the uses and characteristics of synthetic, fur-like fabrics, and also something concerning the manufacture of this relatively new class of materials.

Dorothy S Lyle, director of consumer relations of NID, will describe the maintenance of synthetic fur fabrics.

A question-and-answer period will follow.

The meeting is scheduled for 8:15 pm at the NID Auditorium, 909 Burlington Ave, Silver Spring, Md.

Niagara Frontier

THE Becco Chemical Division of Food Machinery & Chemical Corporation was host to the Niagara Frontier Section for the meeting of March 15, 1957. Dinner was served to approximately 80 members and guests at the Continental Inn Hotel, Buffalo, NY.

H O Kauffmann, director of research, welcomed the members as guests of the Becco Chemical Division and briefly described the role of the company in the textile industry.

W G Helmus, AATCC vice president (Central Atlantic Region), extended greetings in behalf of the national officers and Council.

During the business session Chairman Leyking read the names of members appointed to the various committees. The membership voted unanimously to approve the selected dates of September 28, 29, and 30 for the 1961 National Convention to be held in Buffalo.

The main speaker of the evening was E S Shanley, asst technical director, Becco Chemical Division. The demonstration-talk given by the speaker covered the manufacture and application of hydrogen peroxide. He underlined the contribution made by the research & development group to the introduction of hydrogen peroxide as one of the most widely used oxidizing agents in industry.

Following the talk, a tour was conducted through Becco's plant and research dept.

South Central

AT the February 16, 1957 meeting of the South Central Section, held at the Hotel Patten, Chattanooga, Tenn, Raymond Thornton, head of technical sales service, Arnold, Hoffman & Co, Inc, Providence, RI, discussed "Fiber-reactive Dyes—The Procions".

Speaker at the evening banquet was Judge Raulston Schoolfield, who spoke on the Supreme Court's rulings on segregation as well as the actions taken by the Tennessee legislature.

Western New England

THE Western New England Section met March 15th at Rapp's Restaurant, Shelton, Conn, to hear Jackson A Woodruff, head of the Dyeing and Finishing Division, Textile Research Dept, American Viscose Corp, speak on the topic, "Blends and Finishes Form the Future".

In attendance at the meeting was Hibbard Busby, a charter member of AATCC. Mr Busby is an industrial engineer in the Springfield, Mass, Ordnance District.

Jackson A Woodruff, guest speaker at the March 15th meeting of the Western New England Section

Hibbard Busby (left), an AATCC charter member, enjoys a pre-meeting chat.
(Photos courtesy of A N Henschel, Warwick Chemical Co)

(Photos courtesy of A N Henschel, Warwick Chemical Co)

Papers presented before local sections:

"Lighting Factors to be Considered in Textile Color Matching"—Warren B Reese, Macbeth Daylighting Corp

"Binders for Nonwoven Fabrics"—Neil H Sherwood, B F Goodrich Research Center

"Technology of Nonwoven Fabrics"—L G Lovin and L P Wenzell, Celanese Corp of America

"Random Tumble Pilling Tester"—A G Scroggie, E I du Pont de Nemours & Co, Inc

"Recent Developments in Vat Dyeing"— J M Fletcher, E I du Pont de Nemours & Co, Inc

"Fluorescent White Dyes: How They Work and How They are Evaluated"—Eugene Allen, American Cyanamid Co

"The New Look in Military Purchasing and Distribution of Textiles"—Victor J MacLaughlin, U S Army

"Frontiers in Fabrics and Finishes"—T J Seery, Dept of the Navy

"How Atomic Warfare has Changed Army Requirements for Textiles"—S J Kennedy, US Army Quartermaster Corps

"Changing Trends in Requirements for Parachute Textile Materials"—J H Ross, Wright Air Development Center

"Automotive Fabrics: Factors Which Affect Lightfastness"—C H A Schmitt, Sandoz, Inc

Future Papers

The following material has been submitted to date to the publishers of American Dyestuff Reporter. Subject to the approval of the AATCC Publications Committee, it will appear in the Proceedings in future issues.

Authors, section officials, and committee chairmen are requested to inspect this list and notify the publishers if there are any omissions.

"Dyeing of Synthetic Fibers"—S G Turnbull, Jr, E I du Pont de Nemours & Co, Inc

Other Perkin Centennial Papers

"The Standard Depths of Shade in Relation to the Assessment of Colorfastness of Dyes on Textiles"—Paul Rabe, Farbenfabriken Bayer AG

"Dyes and Dyeing Processes for Special Properties of Color"—J S Kirk, General Dyestuff Co

"Progress in Measuring Color Difference"—G W Ingle, Monsanto Chemical Co

"The Use of Color in National Defense"—S J Kennedy, Quartermaster Research and Development Command

"Seeing Light and Color"—Ralph M Evans, Eastman Kodak Co

"The Chemistry of Organic Pigments"—A Siegal and W S Struve, E I du Pont de Nemours & Co, Inc

"Color in Relation to the Political and Economic History of the Western World"—S M Edelstein, Dexter Chemical Corp

"Color in Ancient Times"—Earle R Caley, Ohio State Univ

"Color Designation through the Ages"—Ernest R Kaswell, Fabric Research Laboratories, Inc

"Early Synthetic Dyes"—Hans Z Lecher, consultant

"Synthetic Dyes for Cotton"—D I Randall, General Aniline & Film Corp

"Dyes for Animal Fibers"—James Ogilvie, National Aniline Div

"Dyes for the Hydrophobic Fibers"—H E Schroeder and S N Boyd, E I du Pont de Nemours & Co, Inc

"Fluorescent White Dyes"—Robert S Long, American Cyanamid Co

"The Theory of Dyeing Cellulosic Fibers"—Emery I Valko, Onyx Oil & Chemical Co

"Theory of Dyeing Polyester and Polyacrylic Fibers"—W R Remington and H E Schroeder, E I du Pont de Nemours & Co, Inc

Minutes———

Two Hundred and Fifth Meeting of the COUNCIL

THE Council held its 205th meeting at the Hotel Statler, New York, N Y, on Friday morning, January 18, 1957.

1) *Present:* Members of the Council present were: President G O Linberg, presiding; Vice presidents W G Helmus, E R Kaswell, E Morrill and H G Smith; R E Derby, incoming treasurer and A E Sampson, outgoing treasurer; C W Dorn, chairman, Executive Committee on Research; Past Presidents W D Appel, J R Bonnar, C Z Draves, R W Jacoby, and P J Wood; P S Durfee, J J Healy and F J Rizzo representing Northern New England; F H Casey, E H Gamble, R B Taylorson and J W Timperley representing Rhode Island; R J Carey and J E Lynn representing Western New England; W F Brommelsiek, P J Fynn, J H Hennessey, A J Kellner, Moore, R. L. Stutz and M Winkler, representing New York; B K Easton representing Niagara Frontier; C T Anderson, W H Bertolet 3rd, A W Etchells, C A Seibert and R A Shimp representing Delaware Valley; A H Gaede, C Hooper, J V Killheffer, R H Souther, P B Stam, and R E Rupp, acting Councilor, representing Piedmont; J Anderson, representing South Central; R B Hallowell and T H McCamy representing Southeastern; L L Heffner representing Washington; E W Camp representing Mid-West; H A DesMarais representing Pacific Northwest; and G P Paine, executive secretary.

Also present were J A Doyle, chairman, Publicity Committee; S M Edelstein, chairman, Archives Committee; W A Holst, chairman, Constitution and Bylaws Committee; A E Johnson, chairman, Corporate Membership Committee; M J Babey, chairman, Subject and Speaker's Bureau; W M Scott, chairman, Publications Committee; C A Sylvester, chairman, Technical Committee on research; A E Herrmann, Jr. Hudson-Mohawk Section; D E Marnon, New York Section; F V Traut, incoming chairman, Conventions Committee, and R R Frey, assistant secretary.

2) *New Officers and Councilors:* The executive secretary presented to the Council George O Linberg, newly elected president, the fourteenth to hold that office; whereupon President Linberg introduced the vice presidents elected for 1957: Ernest R Kaswell, New England Region; Weldon G Helmus, Central Atlantic Region; Elliott Morrill, Western Region; and H Gillespie Smith, Southern Region. The president then introduced the newly elected Councilors present: Philip S Durfee and John J Healy, Northern New England; J William Timperley, Rhode Island; J Edward Lynn, Western New England; Arthur J Kellner, Robert L Stutz and Max Winkler, New York; Carlton T Anderson and William H Bertolet 3rd, Delaware Valley; Clarence Hooper, John V Killheffer, R Hobart Souther and Paul B Stam, Piedmont; Jack Anderson, South Central; T Howard McCamy, Southeastern.

President Linberg called attention to the copies of the Constitution and Bylaws at the places of the Councilors, stating that the Association would live by them. He cited the need to sell AATCC's research program to the textile industry. The president stated that local sections required more help from the national body. There had been five Council meetings each year, but he felt fewer Council meetings might be desirable. A discussion by Mr Linberg followed on the role of Councilors in AATCC affairs and he expressed the desire to have one Councilor from each section serve on policy committees of the Council in order to be fully informed of decisions at the national level and thus be in a position to report back to the Sections. The President thanked the Council for the honor of his nomination and election.

3) *Minutes of the 204th Council Meeting:* The executive Secretary's report of the 204th Council meeting was accepted.

4) *Executive Secretary's Financial Report:* The financial report of December 14, 1956, was accepted.

5) *Treasurer's Report:* A E Sampson, outgoing treasurer, stated his report would be presented in three parts—the Association's finances as of December 31, 1956; a general statement of the condition of the Association's finances; and an introduction of the incoming treasurer, Roland E Derby.

After all bills had been paid, $48,113.41 was in checking accounts, and $114,110.45 in 90-day bills. The cash position was $431,654.73, an increase of $49,140.15 over 1956. Conversion value of all assets into cash was estimated at $563,909.86, by conservative estimate, the highest in the history of the association. The assets were represented by 28.7% in quick cash; 12.9% in savings banks; U S bonds 8.2%; domestic bonds 4%; common stocks 29%; advances 10.2%; inventory and equipment 7%. Dividends and interest showed an increase of $713.13 over last year. Stock dividends had been received. Receipts in total were $88,455.09, as against $75,457.94 last year. Expenditures were $52,905.87 and within the budget but exceeded the previous year by $4,149.12.

A motion was made and seconded: that the treasurer's report be accepted. The motion was adopted.

The treasurer would provide a financial statement as of December 31, 1956, and would arrange with the executive secretary for copies to be circulated to the Council by mail before the next meeting. He recommended that the Association continue under the present system of accounting until the end of the fiscal year at which time a formal changeover from a cash to an accrual basis would take place.

The treasurer thanked the Council for its cooperation during his term of office and for 36 years of pleasant memories over the period of his membership in AATCC. He then presented to the Council the incoming treasurer, Roland E Derby, president of Textile Aniline and Chemical Company, Lawrence, Mass, vice president of AATCC 1941-43, Olney Medal winner 1953.

Mr Derby addressed the council, saying he was happy and honored to accept the responsibilities of treasurer. He had been connected with AATCC since 1921 when a student at Lowell Textile Institute. He noted that the growth of the Association required more specialized talents and that its needs require trained personnel. There was a great responsibility for the Association's investments, necessitating expert advice. He noted that Association affairs were on a more

business-like basis than ever before and that he would try to pick up where Mr Sampson had left off. He thanked the Council for the privilege of being able to serve the Association as treasurer.

A motion was made by Mr Rizzo and seconded: that Mr Sampson be given a rising vote of thanks and commendation for his many years of service. The motion was adopted, whereupon the Council rose in a body to applaud the outgoing treasurer.

6) *Reports of the Outgoing Vice Presidents:* Joseph H Jones was not able to be present. Walter M Scott expressed his thanks to the sections of the Southern Region for their cooperation during his term. F V Traut reported that the Philadelphia Section had been officially renamed the Delaware Valley Section. He stated that he had greatly enjoyed his term of office. E R Kaswell thanked the Sections of the New England Region for their past courtesies and expressed appreciation for his re-election. He commented on the need for vice presidents to act as liaison between the Councilors and suggested that the vice presidents might meet with the Councilors in their regions before each Council meeting.

7) *Archives Committee:* Mr Edelstein reported that his Committee's program had begun. A representative of the National Records Management Council had spent a week at the national headquarters in Lowell reviewing files, records and other material. The Archives Committee planned to ask each Section to appoint one of its members to act as a liaison capacity between his Section and the committee.

8) *Nominations to Membership on Committees of the Council:* A motion was made and seconded: that the names placed in nomination be approved. The motion was adopted. (See pages P136-7 of the February 25, 1957, issue of the *Proceedings* for a complete list of nominees).

9) *Appropriations Committee:* The chairman of the Appropriations Committee, A E Sampson, called attention to Article IV, Section 5 of the Bylaws and commented briefly on the functions of the Appropriations Committee.

The Committee had received and approved several requests for funds, which, if adopted by the Council, would increase the present operating budget from $214,035 to $216, 185, an increase of $2,150.

The Committee recommended that the Council approve the sum of $650 for the purchase of dictating equipment for the national headquarters, and that the budget for the permanent equipment account, G4, be increased from $2,000 to $2,650. A motion was made and seconded: that the recommendation be approved. The motion was adopted.

The Committee recommended that the Council authorize the expenditure of approximately $55.00 to buy sufficient rights to purchase one share of International Paper Company common stock for the General Research Fund. A motion was made and seconded: that the recommendation be approved. The motion was adopted.

The Committee recommended that the Council approve an appropriation of $1,000 to increase the budget of the Bonds and Audit account, G13, from $1,200 to $2,200 that certain projects authorized by the Council and undertaken by Price Waterhouse & Company might be paid for as completed. A motion was made and seconded: that the recommendation be approved. The motion was adopted.

The Committee recommended that the Council approve an appropriation of $100 for the purchase of AATCC lapel pins, which would be resold. This appropriation would be applied to the budget of the Technical Supplies account, M29. A motion was made and seconded: that the recommendation be approved. The motion was adopted.

The Committee recommended that $400 be appropriated to a new Technical Supplies account, M49, to cover the purchase of membership certificates and plaques for resale to corporate members. A motion was made and seconded: that the recommendation be approved. The motion was adopted.

Mr Sampson said that anticipated expenditures were running within the budget.

10) *Technical Supplies Committee:* Mr Paine reported that the Technical Supplies Committee had entered into a revised contract with the Atlas Electric Devices Company on the matter of royalties to AATCC on the sale of the Accelerotor and the newly developed Random Tumble Pilling Tester. A royalty scale had been worked out by mutual agreement between the Association and the company which provided a more equitable arrangement for both parties.

11) *Howes Contract Committee:* Mr Kaswell reported that the Committee had met with the management of the Howes Publishing Company and that it had been mutually agreed to negotiate a new contract. Mr Kaswell expressed the hope that a full report could be made to the Council at the March 29th meeting.

12) *Constitution and Bylaws Committee:* Mr Holst stated that while the committee was not in a position to make any formal proposal for revisions at that time, he would outline the several proposed amendments on which his committee was working. Since last year, it had been apparent that certain changes were desirable and that these could be introduced only after the committee made a formal recommendation to the Council. The Committee was studying the Constitution and Bylaws with a view to recommending the use of "executive secretary" for "secretary" in appropriate places, rewriting the duties of the executive secretary and treasurer in accordance with the proposals made in the Council; providing for assistant treasurer and description of duties, including administrative duties of executive secretary with respect to paid personnel at national headquarters, reserving authority in technical matters to ECR, changing description of Councilors from "Sectional" to "National"; substitution of "Delaware Valley Section" for "Philadelphia Section," clarification of the details of counting ballots in the election of national officers; adding interpretative functions to the responsibilities of the Constitution and Bylaws Committee, subject to appeal to the Council: adding the Archives and Inter-Society Relations Committees with a description of their duties to the list of Standing Committees of the Council; and the correction of minor confusing discrepancies in the existing Bylaws.

13) *Subject and Speaker's Bureau Committee:* Mr Babey requested that Richard R Frey be appointed recording secretary of the Subject and Speaker's Bureau Committee. The appointment was approved.

It had been reported to the Council that the Committee had been in touch with B F Goodrich Company concerning its Speaker's Bureau. Since that time the Committee had received a folder which included a list of available speakers, with their pictures, who were available from the company. The Committee was planning to send this folder along with its latest listings of speakers to the local sections. Mr Babey expressed the hope that other lists of this type could be obtained and asked that he be informed of other listings. The Commit-

tee would continue to aid each Section in its speakers programs. He extended thanks for the many letters of appreciation the Committee had received for its efforts. He requested that anyone who has presented or would present a paper and would like to be placed on the listing to send in his name and the title of the paper.

14) *Publicity Committee:* Mr Doyle reported the composition of the Publicity Committee as: the publicity chairmen of the 14 local Sections, any AATCC members whose assistance would be of special value, a national chairman and vice chairman, and the executive secretary of the Association. The Committee was presently composed of the following members:

James A Doyle, *chairman*
George P Paine, executive secretary, AATCC
Raymond J Carey, 1957 Convention Publicity Committee
Joseph J McGuinness (New York)
John C Cook (Southeastern)

A vice chairman would be appointed when the Committee roster is completed.

Other members from the various sections not yet named would be appointed when designated by the local Section chairman.

There had been no formal Committee meetings in 1956 and none were contemplated in 1957. The chairman stated that the Committee had functioned adequately by personal contact at convention and Council meetings and by mail.

In 1956, publicity had been placed in at least 30 newspapers and 35 trade and professional magazines. Publicity had doubtless appeared elsewhere beyond the notice of the clipping service. The Committee had cooperated effectively with Ansco G Bruinier, Jr, and his members of the Publicity Committee on Perkin Centennial publicity and had cooperated in the operation of an effective press room during the Perkin Centennial in New York.

Mr Doyle had discussed the 1957 convention publicity requirements with the convention publicity chairman, Raymond J Carey, and had supplied lists and information. Similar discussions had been held with J G Kelley of the Mid-West Section concerning advance publicity for the 1958 convention in Chicago.

Copies of the AATCC publicity manual had been distributed to Section publicity chairman and also to members of the Council. New members of the Council in 1957 would receive copies.

Mr Doyle reiterated a request that the key officials of AATCC, national officers, Councilors, and committee chairman, remain alert to the need for publicity as a means of increasing the Association's stature. He reminded the Council that almost everything its committees and members did for the Association would have some news value but only if it were brought to the attention of the publicity facilities of the Association.

15) *Executive Committee on Research:* Charles W Dorn, chairman, reported on the decisions reached at a meeting of ECR held January 17, 1957. These are covered in the minutes of the 191st meeting of the Technical Committee on Research, which appear beginning on page P176 of the March 11, 1957, issue of the *Proceedings.*

16) *Inter-Society Relations Committee:* Dr Draves reported that the Committee had been studying AATCC's representation on the Consumers Standards Board of the American Standards Association. There had been several discussions with representatives of ASA, and in the light of prohibition of endorsing standards by AATCC, it was felt that AATCC should withdraw from the Consumer Standards Board. It had been suggested by the American Standards Association that, if a board were to be established concerning itself exclusively with the textile field, AATCC might be more appropriately represented in dealing with standard test methods. A motion was made and seconded: that the AATCC withdraw from the Consumer Standards Board of the American Standards Association. The motion was adopted.

At the suggestion of ECR, C A Sylvester had been appointed to represent AATCC on US Department of Commerce Committee CS 59-44, Standard Method of Testing and Reporting Textile Fabrics.

ECR had recommended that the Inter-Society Relations Committee appoint an observer to attend a meeting of the National Committee on Surface-Active Agents, being formed by Emery I Valko, Onyx Oil and Chemical Company. Dr Draves would represent AATCC in that capacity.

17) *Publications Committee:* Dr Scott reported that the following appointments had been accepted for membership on the *American Dyestuff Reporter* Award Committee: Robert W Joerger, *chairman;* Richard B Stehle, and Hector C Borghetty.

The American copyright to the *Colour Index* had been obtained for Volume 1. The Publications Committee had decided to defer consideration of supplements to the *Colour Index* until distribution of the four volumes is completed.

The Committee had agreed to insert in the alphabetical list of dyestuffs in the *1957 Year Book* an extra column giving the new *Colour Index* Part I numbers. Mr Cady had proposed abbreviations for the "Classification" column, eg, "Dir" for "Direct," "DD" for "Direct Developed"; for the "*Colour Index* Part I" column, eg, "Acid Yel" for "Acid Yellow," "Oxid Base" for "Oxidation Base." These had been approved with one addition, eg, "VS" for "Vat-Sulfur." Mr Cady had also proposed to place in the left-hand column in bold-face type the heading of each group of dyes, eg, Acco, Aceko, etc. Mr Cady had asked the Committee whether the Part II numbers should be given for the Prototype list where they had been assigned. The committee voted to include these where possible. Mr Holst had been instructed to notify Mr Cady of these actions.

The Publications Committee had considered a request from the executive secretary for the preparation of a budget for the publication of *The Proceedings of the Perkin Centennial.* After some discussion the Publications Committee decided that this publication came under the jurisdiction of the Perkin Centennial Committee rather than the Publications Committee. The Committee was seeking the concurrence of the Council in this view.

At this point, Dr Scott stated that the chairman of the Textile Education Committee had not been able to be present and that he would give the Committee's report. H A Rutherford had been appointed to spearhead preparation of a brochure outlining the advantages to be obtained from a textile-chemical education. A specialist to assist in the preparation of an AATCC brochure was being considered. P J Wood referred to a similar brochure published in England by the Confederation of Textile Dyers and Finishers. This had been published at no cost to the Confederation through revenue obtained from advertising pages and 15,000 copies had been printed. Mr Wood stated that he had reviewed this publication for *Textile Age* recently and that he received 57 requests for the booklet.

Mr Sampson referred to Dr Scott's statement on the jurisdiction of the Publications Committee concerning *The Proceedings of the Perkin Centennial* and cited Article 4, Section 7 of the Bylaws, which states that

the Publications Committee is to have full charge of the publications of the Association. An account for the publication, M48, had been set up on the Association's books to provide for receipt of contributions received to underwrite its publication. This account had been set up to provide "parking space" for such funds in addition to monies received from the sale of copies of *The Proceedings of The Perkin Centennial*, which distribution would be in addition to copies given to each registrant for the Centennial. Dr Scott said that the Committee felt as it did because, despite the receipt of funds applicable to *The Proceedings of the Perkin Centennial*, there would probably be a deficit which should be taken out of the Convention Fund since it would concern the Perkin Centennial.

Mr Holst said that the record stated there would be an overrun of about 165 copies of *The Proceedings of the Perkin Centennial* and that it was the Publications Committee's thought that the Perkin Centennial would handle the book without touching the Publications Committee budget.

Mr Sampson again stated that the funds would have to be kept in a separate account.

18) *Perkin Centennial Committee*: Mr Jacoby reported that the publication of the book of proceedings was under way. About 70% of the final edition of the manuscripts were in the hands of the printers and the remainder were expected to be received by January 18th. All proofs would be available by February 1st and a deadline of February 20th had been established for return of corrected proofs by authors. It was expected that the book of proceedings could be mailed about April 1st. The Perkin Centennial Committee had agreed to publish a book of proceedings and authors had expanded their papers with a wealth of valuable information. The Committee could have asked the authors to cut their manuscripts but the public would be deprived of important material. A firm order for 2,000 copies of the book had been placed with the printer. Companies had been glad to support the project for underwriting the book and $11,000 had been received, plus $200 for individual orders for the book. The Association was committed to supply 1,985 copies to registrants and it was expected there would be a 7% to 10% overrun on the printing. Mr Jacoby referred to the sale of the Vat Monograph #2, which had sold slightly over 2,000 copies from a printing of 5,000. From this experience he felt that the book of proceedings should not be printed in quantity. He stated that 64 authors would be represented in the book and that this volume would underscore one of the objects for which the Association was founded, ie, the dissemination of professional information.

A motion was made by John H Hennessy and seconded: that the entire cost of the publication of *The Proceedings of the Perkin Centennial* be borne by the treasury of our Association and that any monies thus far subscribed for this purpose be returned with sincere thanks to the donors for the following reasons:

1) The amount involved is more than covered by our current convention fund.

2) We have incurred a considerable amount of displeasure in soliciting funds from the sponsors of speakers.

3) Our future conventions with regard to speakers as well as corporate membership expansions stand to suffer as a result of this solicitation.

The motion was debated at considerable length. Mr Kaswell asked when solicitation was started and Mr Jacoby replied that it had commenced prior to the last Council meeting. The president referred to the minutes of the last meeting of the Council, which contained a report of the solicitation. He noted that no objections had been raised to it at that time. Mr Jacoby indicated he had conferred personally with representatives of a number of companies to find out how they felt about underwriting the book of proceedings and he had been encouraged. Dr Draves stated it had been the policy of the Association to request funds for worthy causes before the fact and felt it would be a mistake not to return the contributions. Mr Wood declared that the situation would be muddled if monies were to be refunded. He suggested that no further solicitation be undertaken.

The president called for a vote on the motion by show of hands. The motion was defeated.

A motion was made and seconded: that activities in solicitation of funds for underwriting *The Proceedings of the Perkin Centennial* cease. The motion was adopted.

19) *Membership and Local Sections Committee*: In the absence of the chairman, Mr Kaswell reported that 86 membership applications had been received since the last meeting of the Council: Senior 40; transferred to Senior 9; Associate 16; Junior 4; Student 16; Corporate 1. A motion was made and seconded: that the applicants be elected to membership. The motion was adopted. (See page P137 of the February 25, 1957 issue of the *Proceedings*).

Mr Kaswell reported that total members in all classes as of May 1, 1956 was 6,841. New members and memberships restored and reinstated from May 1, 1956 to January 15, 1957 were 499. Members who had resigned, were dropped or who were deceased accounted for a loss of 175 members during that period. The net membership increase was 324, bringing the total membership as of January 15, 1957 to 7,165.

20) *National Convention Committee*: Mr Traut reported that the 1961 convention would be held in Buffalo, the 1960 convention in Philadelphia, the 1959 convention at the Sheraton Park and Shoreham Hotels in Washington, DC, and the 1958 convention at the Conrad Hilton Hotel in Chicago. Mr Kaswell stated that the dates of the 1957 convention in Boston were November 14, 15 and 16. Mr Morrill asked for suggestions for the 1958 Chicago convention.

21) *Corporate Membership Committee*: Mr Johnson stated that total corporate and sustaining memberships received and committed totaled $31,730 for the period of August 1, 1956 to January 16, 1957. This was an increase of $880 over the same period in the previous year. The figure included 138 renewals of $29,920 and 12 new members at $1,300 and 50 sustaining members totaling $510.

Mr Johnson displayed membership certificates and plaques and stated that a number of companies had responded to the opportunity to purchase these.

22) *Colour Index Marketing Committee*: Mr Sampson stated that US Customs had released 500 copies of Volume 1, Part I of the *Colour Index* on January 16, 1957 and that on the following day volumes were processed and forwarded to the advance subscribers. An additional 1,000 volumes had been ordered from England and would be available about February 15, 1957. AATCC had been informed by the United States Copyright Office that it could import a maximum of 1,500 sets of the *Colour Index*. 243 sets had been taken up in advance subscriptions. The January 15 edition of the *Dyestuff Reporter* carried an announcement that subscriptions to the *Colour Index* would be accepted. The January 28 edition of the *Dyestuff Reporter* would notify all members of the Association that orders would be taken for $99.00 per

set from the period of February 1st to May 1st, that the edition is limited, and that after May 1st a price advance would probably occur. During a recent canvass 1,431 inquiries were received. Each had been acknowledged with a letter accompanied by an order blank and prospectus. As far as could be determined, Volume 2 would be available for delivery about April 15, 1957; Volume 3 September 1957; and Volume 4 February-March 1958, but these dates were not firm.

Mr Sampson informed the Council that the Society of Dyers and Colourists, even after repeated cautioning, had departed from the terms of the contract and in this instance, had released copies of the *Colour Index* on December 31, 1956 instead of effecting a simultaneous release with AATCC on January 17.

A volume of the *Colour Index* was presented for inspection to the Council.

23) *Unfinished Business*: A motion was made and seconded: that Elliott Morrill be appointed to the National Convention Committee. The motion was adopted.

It was moved and seconded that no meeting of the Council be held in September of 1957. The motion was adopted.

A motion was made and seconded: that 2,100 copies of *The Proceedings of the Perkin Centennial* be printed. The motion was adopted.

24) *Adjournment*: A motion was made and seconded: that the meeting adjourn. The motion was adopted, whereupon the Council adjourned at 12:40 P.M.

G P Paine
Executive Secretary

—•—•—

206th Council Meeting

(concluded from page P282)

M A Hanrahan	S S Parekh
J E Howard	F G Pielenz
N Khan	E O Pua
J L Marvel	K Rhee
J B de Melo	J J Santos
B L Niemeyer	A J Villani
R Ormerod	S M Wheaton

TRANSFERRED FROM OTHER CLASSIFICATIONS TO SENIOR

F J DiCarlo	R E Sasseville
L M Flamberg	R K Shaughnessy
R A Ford	F P Tully
R H Freeman	L S Shefter
W A Gaddes	S P Tilton
R E Maurer	J M Weisman

MEMBERSHIP APPLICATIONS

George R Adams—Research and development chemist, Lord Mfg Co, Erie, Pa. Sponsors: W B Broadbent, D A Anderson. (DV)

Howard F Bjork—President, Althouse Chemical Co, Reading, Pa. Sponsors: H C Gift, E W Kent. (DV)

Thomas W Blackwell—Tech service repr, Sales Service Dept, Corn Products Refining Co. Sponsors: C R Blumenstein, R A Lyons. (S)

Raymond C Buck, Jr—Dyehouse foreman, Swift Mfg Co, Columbus, Ga. Sponsors: M S Williams, W H Jackson. (S)

Bernard L Cozette—Chemist-tech dir, Wade, Wenger & Associates, Inc, Chicago, Ill. Sponsors: R W Haas, E W Camp. (MW)

Virginia C Ester—Chemist, Glass Fabrics Finishing Corp, Cedar Grove, NJ. Sponsors: J F Cobianchi, W G Helmus. (NY)

Frank S Foster—Industrial engr, fabric development, Engineering Dept, Research & Development Div, Callaway Mills Co, La Grange, Ga. Sponsors: W B Carroll, T B Hunt. (S)

William W Graham—Lab mgr, E I du Pont de Nemours & Co, Inc, Chicago, Ill. Sponsors: H A Lips, J G Kelley. (MW)

John F Harris—Plant chemist & quality control mgr, Deltox Rug Co, Div Armstrong Cork Co, Oshkosh, Wis. Sponsors: P D'Amour, H W Ericson. (MW)

Victor T D Humphreys—Research chemist & colorist, American Aniline Products, Inc, Lock Haven, Pa. Sponsors B H Kirby, Jr, L Galloway. (DV)

Paul Klotz—Technician, Gen Export Co, New York, NY. Sponsors: A Malick, H M Friedman. (NY)

Raymond V Leary—Salesman-chemist, National Aniline Div, Allied Chemical & Dye Corp, Chicago, Ill. Sponsors: E W Camp, E L Miller. (MW)

Maurice S Letourneau—Sales repr, Polyco-Monomer Dept, Chemical Div, The Borden Co, Leominster, Mass. Sponsors: L Shapiro, D F Lowry. (RI)

Edward C Murphy—Dyer, Collins & Aikman Co, Albemarle, NC. Sponsors: A R Thompson, E P Ward. (P)

Michael Peaces—Production supervisor, American Cyanamid Co, Bound Brook, NJ. Sponsors: R J Cegelka, N Koenigsberg. (NY)

Robert C Reall—Dyer, Collins & Aikman Co, Albemarle, NC. Sponsors: A R Thompson, E P Ward. (P)

Z Anthony Roumas—Chemist, Hudson Worsted Co, Hudson, Mass. Sponsors: E C Hansen, G M Gantz. (NNE)

Frederick H Sexsmith — Research chemist, Chicopee Mfg Corp, Chicopee Falls, Mass. Sponsors: W S Barnard, S A Simon. (WNE)

H Michael Strub, Jr—Mgr, technical service, The Duplan Corp, Winston-Salem, NC. Sponsors: J F Cairns, F J Potter. (P)

Philip Surowitz—Supervisor, industrial non-woven fabrics research, Chicopee Mfg Co, Milltown, NJ. Sponsors: J K Sumner, A D Nacht. (NY)

JUNIOR

Arnold G Bolliger—Dyehouse technical supervisor, Dominion Woolens & Worsted Ltd, Hespler, Ont, Canada. Sponsors: E A Lister, E R Eakins.

Buisan E Enrique—Textile chemist, Ciba SA, Barcelona, Spain. Sponsors: F Mauri, C Hornstein.

Thomas C Manzolillo, Jr—Lab tech, Althouse Chemical Co, Reading, Pa. Sponsors: J W Auman, H C Gift. (DV)

ASSOCIATE

Jyoji Aida—Chief, Engineering Section, Matsumoto Yushi Seiyaku Ltd, Osaka, Japan.

Mildred L Bell—Textile research assistant, University of Minnesota, St Paul, Minn. (MW)

William K Hancock — Industrial engr, Research & Development Div, Callaway Mills Co, La Grange, Ga. (S)

Victor E Schaefer—Salesman, Onyx Oil & Chemical Co, Jersey City, NJ. (DV)

David M Sheehan—Research chemist, The Carters Ink Co, Cambridge, Mass. (NNE)

Stuart A Warshaw—Vice president & sales manager, Berkshire Color & Chemical Corp, Springfield, Mass. (WNE)

Milton W Williams—Branch mgr, F H Ross & Co, Greenville, SC. (P)

STUDENT

Chris Chingros—Lowell Tech Inst. Sponsor: G R Griffen.

William F English—Alabama Polytechnic Inst. Sponsor: C L Adams.

Naseeruddin Khan — Philadelphia Textile Inst. Sponsor: W H Hughes.

Edmund O Pua—Lowell Tech Inst. Sponsor: G R Griffin.

John J Santos—Lowell Tech Inst. Sponsor: G R Griffin.

APPLICATIONS FOR TRANSFER TO SENIOR MEMBERSHIP

Roland E Sasseville
Shirley P Tilton
Francis P Tully

The National Headquarters Office
of the Association
Will Accept Until Further Notice
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THE SECOND EDITION
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IN FOUR VOLUMES
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American Association of Textile Chemists and Colorists
Box 28, Lowell, Massachusetts

EXAMPLE OF ENTRY IN PART I

C.I. 69025 Anthraquinone **C.I. Vat Orange 1**

APPLICATION

DYEING

METHOD

A/Q1 ☐
A/Q2 ■
A/Q3 ◘
Indigoid ☐

LEUCO COMPOUND
Alkaline, orange brown
Acid, brownish yellow

PROPERTIES (COTTON) Affinity and levelling, good. For data on strike, levelling and migration see *JSDC*, **66** (1950), 505

Suitable for pigment pad-jig, pad-steam, continuous piece and vat-acid processes

Vat in short liquor

Cotton Affinity and levelling good. Dead cotton covered fairly well

Viscose Good affinity at low temperature; at high temperature the hue is redder and duller

Cotton/Viscose Good solidity when dyed cold. At 50°C viscose dyed heavier than cotton

Silk Suitable

PRINTING

Cellulose Applied by normal processes giving redder and duller hues than when dyed. Dischargeable in pale and medium shades in the presence of an assistant

FASTNESS PROPERTIES etc

	A	B	C
CROSS DYEING (Chrome)	..	5	5
HOT PRESSING ...	5	5	5
HYPOCHLORITE ...	5	5	5
LIGHT ½–¼ Normal	5–6	6	6
Normal	6–7	6–7	6
2× Normal	..	7	6–7

	A	B	C
MERCERISING ...	5	5	5
PEROXIDE BLEACHING	5	5	5
SODA BOIL (open kier)	4–5	5	5
SODA BOIL followed by HYPOCHLORITE ... (Combined test)	4–5	4–5	..

Tendering on exposure to light not accelerated

FASTNESS ON SILK (B) Degumming 5, Hot pressing 5, Light 6–7, Peroxide bleaching 4–5

TEXTILE USAGE

DYEING

Cellulose On account of good level dyeing and all-round fastness as a shading colour where good light fastness is required. Suitable for curtains, hangings and for goods to be bleached, e.g. shirtings and towels

Silk For good fastness to degumming, peroxide bleaching and washing

Unions For cotton/viscose fabrics

PRINTING

Cellulose For direct print styles or as pigment with binder on cotton and viscose

HUE **Yellowish Orange**

ARTIFICIAL LIGHT: redder

Benzadone Gold Orange 3G	**YDC**
Caledon Gold Orange 3G	**ICI**
Carbanthrene Golden Orange 3G ...	**NAC**
Cibanone Golden Orange 3G	**Ciba**
Cibanone Golden Orange 3G℗ ...	**Ciba**
Fenanthren Golden Orange 3G ...	**G**
Indanthren Golden Orange 3G ...	**FBy**
Indanthrene Golden Orange 3GA ...	**G**
Indanthrene Golden Orange 3GF ...	**G**
Indanthrene Golden Orange 3GWP ...	**G**
Ponsol Golden Orange 3G	**DuP**
Ponsol Golden Orange 3GD	**DuP**
Sandothrene Golden Orange N3G ...	**S**
Solanthrene Orange 3J	**Fran**
Tinon Chlorine Golden Orange 3G ...	**Gy**

Reactions on Cellulose

H_2SO_4 conc.— greenish blue

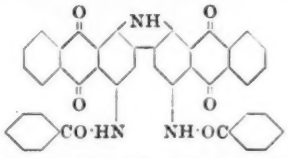
An example from the Vat dyes section of Part I is reproduced above and a specimen page (carbazole vat dyes) from the Anthraquinone section of Part II is shown opposite.

These two examples illustrate the information which appears in Parts I and II and demonstrates the dual reference system which connects the two Parts, e.g.

C.I. Vat Orange 1 in Part I and **C.I. 69025** in Part II are complementary.

The format for the dyes in Part I varies with the amount of information available. Some dyes occupy a whole page, others only part of a page. For example, the space occupied by these notes may be used to accommodate information on **C.I. Vat Orange 2.**

69005 **C.I. Vat Green 9** (*Brownish grey → Dull olive*)



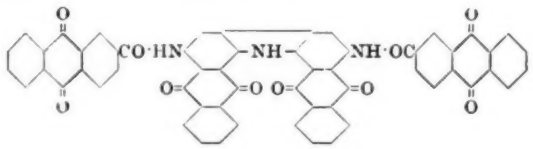
(*a*) Condense 1-benzamido-4-chloroanthraquinone with 1-amino-4-benzamidoanthraquinone in presence of copper and cyclise with chlorosulfonic acid
(*b*) Cyclise 4,4′-dibenzamido-1,1′-dianthrimide in sulfuric acid and oxidise the product

$Na_2S_2O_4$, alkaline — reddish brown; acid — yellowish brown

Discoverer — W. Mieg 1910
Bayer Co., *BP* 2702/09, 11932/09, 25986/09, 29352/10, 15753/12; *USP* 986521, 996109; *FP* 400653, 409407, 432449; *Sw.P* 55556; *GP* 220581, 225232, (*Fr.* **9**, 764, 1197), 228992, 239544, (*Fr.* **10**, 644, 638), 464292 (*Fr.* **16**, 1354)
Brit. Dye. Corp., *BP* 289191
BIOS 1493, 29; *FIAT* 1313, **2**, 135
FIAT 764 — Indanthrenoliv R
Vlies, *JSDC*, **30** (1914), 29
Fierz-David, 584 and Suppl. 82
Houben, 466, 662
Mayer, 181
Fierz-David & Blangey, Table 19
Fraser-Thomson, *JSDC*, **52** (1936), 242
Thorpe, **1**, 422

Soluble in *o*-chlorophenol
Slightly soluble in chloroform, pyridine
Insoluble in acetone, alcohol, toluene, xylene
H_2SO_4 conc. — red; on dilution — flocculent olive green ppt.

69010 **C.I. Vat Green 22** (*Olive*)

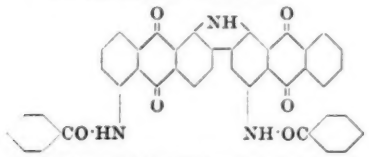


Condense 4,4′-diamino-1,1′-dianthrimide with 2 mol. 2-anthraquinonecarbonyl chloride and cyclise

Discoverer — F. Baumann 1929
I.G., *BP* 349714; *USP* 1819014; *FP* 696423; *GP* 513608 (*Fr.* **17**, 1398)
BIOS 1493, 28
FIAT 764 — Indanthrenoliv 3G

H_2SO_4 conc. — yellowish brown
$Na_2S_2O_4$, alkaline — reddish brown; acid — brownish yellow

69015 **C.I. Vat Brown 5** (*Brown*)



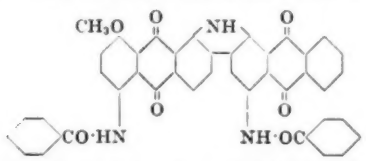
Condense 1-benzamido-5-chloroanthraquinone with 1-amino-4-benzamidoanthraquinone in presence of copper and cyclise with sulfuric acid

$Na_2S_2O_4$, alkaline — reddish brown; acid — yellowish brown

Discoverer — W. Mieg 1910
Bayer Co., *BP* 2702/09, 11932/09, 25986/09, 29138/09, 29352/10, 15753/12; *FP* 400653, 432449; *GP* 220581, 225232, (*Fr.* **9**, 764, 1197), 228992, 239544, (*Fr.* **10**, 644, 638), 491428 (*Fr.* **16**, 1349)
Brit. Dye. Corp., *BP* 289191
BIOS 1493, 10, 12; *FIAT* 1313, **2**, 106
FIAT 764 — Indanthrenbraun R, FFR
Fierz-David, 576 and Suppl. 82
Mayer, 181
Fraser-Thomson, *JSDC*, **52** (1936), 243
Thorpe, **1**, 422

Slightly soluble in xylene
H_2SO_4 conc. — dull wine red; on dilution — reddish brown flocculent ppt.

69020 **C.I. Vat Brown 36** (*Reddish brown*)

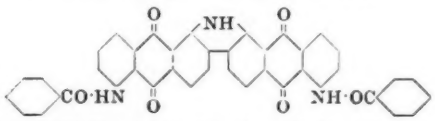


(*a*) Condense 1 - amino - 4 - benzamidoanthraquinone with 1 - benzamido-5-chloro-4-methoxyanthraquinone and cyclise
(*b*) Condense 1 - amino - 4 - benzamidoanthraquinone with 1 - benzamido-5-chloro-4-hydroxyanthraquinone, methylate the hydroxy group and cyclise with sulfuric acid

Discoverer — F. Baumann 1926
I.G., *BP* 298696; *USP* 1885172; *GP* 481362 (*Fr.* **16**, 1326)
BIOS 1493, 44
FIAT 764 — Indanthrenrotbraun 5RF
Fox, *JSDC*, **65** (1949), 513

H_2SO_4 conc. — violet; on dilution — red
$Na_2S_2O_4$, alkaline — brown; acid — brown (yellower)

69025 **C.I. Vat Orange 1** (*Yellowish orange*)



(*a*) React 5,5′-dibenzamido-1,1′-dianthrimide with sulfuric acid and oxidise
(*b*) React 1-benzamido-5-chloro-anthraquinone with 1-amino-5-benzamidoanthraquinone in the presence of nitrobenzene and cupric chloride

Discoverer — P. Fischer 1910
Bayer Co., *Sw.P* 115114
Cassella Co., *GP* 239544 (*Fr.* **10**, 638), 249000 (*Fr.* **11**, 621)
BIOS 1493, 15, 77; *FIAT* 1313, **2**, 119
FIAT 764 — Indanthrengoldorange 3G
Fierz-David Suppl. 82
Thorpe, **1**, 423

Slightly soluble in nitrobenzene, tetralin, xylene
Insoluble in alcohol
H_2SO_4 conc. — greenish blue; on dilution — orange
$Na_2S_2O_4$, alkaline — yellowish brown; acid — yellow

CONTENTS

The work has been completely re-designed and brought up-to-date with the co-operation of all the dye manufacturers in Great Britain, America, Western Europe, India and Japan. The 2nd Edition is in three main parts.

PART I

PART I— consists of two volumes each of approximately 1,000 pages. It deals with all commercially homogeneous dyes and pigments in current use (approximately 4–5,000 dye entities and 25,000 commercial names) within groups relating to their main usage, e.g. Disperse, Acid, Azoic, Direct, Pigment, Solvent etc. The data included comprises the commercial name and manufacturer's initials, methods of application, fastness properties, established usages, reactions on the fibre and literature references relating to application. In the absence of a single accepted international system of fastness assessment it has been necessary, in this Edition, to make provision for the inclusion of data according to one or more of the following—

A— (American) The methods of The American Assóciation of Textile Chemists and Colorists.
B— (British) The methods of The Society of Dyers and Cólourists.
C— (Continental) The methods of the Deutsche Echtheitskommission.

An important feature of PART I is the sub-division of each usage group into hue groups— Yellow, Orange, Red, Violet, Blue, Green, Brown and Black. The hue classification has been made by reference to a Hue Indication Chart which has been designed specially for the purpose. A copy of the chart is included with each set of volumes.
Each dye or group of identical dyes carries a PART I serial name and number, e.g. **C.I. Vat Orange 1**, and also a five digit PART II number in those cases where the chemical constitution of the dye is known.

VOLUME 1 Foreword — Preface — Contents of Volumes 1-4 — Introduction to Part I
Acid Dyes (including the premetallised dyes) — Mordant Dyes — Basic Dyes — Disperse Dyes — Natural Dyes and Pigments — Food (Food, Drug and Cosmetic) Dyes

VOLUME 2 Direct Dyes — Sulphur Dyes — Vat Dyes — Ingrain Dyes — Azoic Dyes (sub-divided into Coupling Components, Diazo Components and Azoic Compositions) — Oxidation Bases — Pigments (inorganic and organic) — Solvent Dyes — Fluorescent Brightening Agents — Developers — Reducing Agents

PART II

PART II— is one volume of approximately 700 pages. It contains data relating to chemical constitution, method of preparation, patent and literature references relating to manufacture or constitution, solubilities and reactions in substance for approximately 3,800 dyes and pigments. The 1st Edition recorded 1,316 constitutions, and this very big increase is partly due to the fact that many co-operating dye manufacturers have, for the first time, disclosed the constitution of certain of their dyes. In addition there is the information contained in the reports compiled by Allied Investigating Commissions on the German Dyestuff Industry.

The dyes are arranged in order based on their chemical constitution following broadly the lines of the 1st Edition. A number of refinements have been introduced and there are two new sections, viz— AZOIC (the coupling components and the diazo components for the production of Insoluble Azo dyes on the fibre) and PHTHALOCYANINE.

Each entry carries a five digit reference number. These numbers do not progress in unit steps as provision has been made to allow the insertion of new constitutions in later editions or supplements without having to change the numbers now allocated in the 2nd Edition. Each entry also carries the complementary PART I serial name and number thus providing easy cross reference to the data in PART I. It also contains alphabetical and empirical formula indexes to all the Intermediates relating to individual dye entities.

VOLUME 3 Introduction — Nitroso — Nitro — Azo — Azoic — Stilbene — Ketonimine — Triphenylmethane — Xanthene — Acridine — Quinoline — Methine — Thiazole — Indamine — Indophenol — Azine — Oxazine — Thiazine — Sulphur — Lactone — Aminoketone — Hydroxyketone — Anthraquinone — Indigoid/Thioindigoid — Phthalocyanine — Natural — Oxidation — Inorganic Pigments — Alphabetical index of Intermediates — Empirical formula index of Intermediates

PART III

PART III— is one volume of approximately 400 pages containing the general index to PART I and PART II (see CONTENTS, [iv]). The Commercial Names Index includes the names (in italics) of dyes not in current use, many of which are related to data in PART I and/or PART II.

VOLUME 4 Hue Indication Chart (in pocket) — Dye Manufacturers' Initials (in alphabetical order) and Names — Dye Manufacturers' Names (in alphabetical order) and Initials — Abbreviations used in Parts I and II — Fastness Tests etc — Patents Index — Conversion Tables relating Colour Index 1st Edition to Colour Index 2nd Edition numbers and Schultz Farbstofftabellen (7th Edition) numbers to Colour Index 2nd Edition numbers and to AATCC Prototype numbers — Commercial Names Index — Additions and Corrections

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• PATENT DIGEST •

PAUL WENGRAF

WATER-REPELLENT THERMOPLASTIC FIBERS——— Composition of Wax, Amine Soaps and Aluminum (or Zirconium or Titanium) Salts G,2,02

USPat 2,759,851 (Am Cyanamid——Fluck, Logan ——Aug 21, 1956)

Water-repellent finishes consisting of combinations of waxes, paraffin or the like in soap dispersion with aluminum acetate or another Al salt of a lower organic acid have been described many times in the past. These finishes are not durable in washing (see specification col 1, lines 38-40).

It was found quite unexpectedly that thermoplastic synthetic hydrophobic textile fibers (acrylic, polyester or polyamide fibers) treated with similar compositions could be rendered durably water repellent. This was proved by subjecting the material to the AATCC standard spray-test and drycleaning test methods (*1952 AATCC Year Book*, page 136). A wax emulsion, prepared by the dispersion of paraffin, ozokerite or the like, optionally blended with a small amount of an ester wax (Carnauba, Montan wax), may be dispersed with an amine soap, preferably a triethanolamine soap. The soap can also be formed *in situ* by adding the fatty acid and the amine separately to the composition. Metal salts to be added may be aluminum acetate, aluminum formate, zirconium formate, titanium formate, and so on.

Example: A wax emulsion (pH of 8.5) consisting of paraffin, Carnauba wax, stearic acid and triethanolamine was stirred in water at 175° F; thereupon a metal solution containing aluminum acetate, aluminum formate and zirconium acetate, showing a pH of 4.5, was mixed with this emulsion by stirring. The fabrics were then padded in this dispersion. Spray-test results on nylon, Dacron, polyacrylonitrile and vinyl-acrylonitrile copolymer fibers were between 90-100 after several washing and drycleaning cycles, whereas the hydrophobic effect on the control sample (cotton) was completely destroyed, as expected.

Among the references cited by the Patent Office:

USPat 2,455,886 (Sayles Finishing/1948) covers water-repellent finishes which may be obtained with a composition of zirconium salts and cetylacetamide acetate for cotton, rayon, etc. [cf *Am Dyestuff Reptr* 38, 325 (1949)].

USPat 2,628,937 (Courtaulds/1953) covers antistatic solutions of dibasic acid or monobasic salts of triethanolamine (eg, sebacates or laurates).

DYEING ACRYLONITRILE POLYMERS——— Heat and Pressure Pretreatment C4,07

USPat 2,750,250 (Du Pont——Lindenstruth——June 12, 1956)

The difficulties encountered in the dyeing of textiles composed of acrylonitrile homopolymers or copolymers with vinyl derivatives (such as vinylpyridine) containing 85% or more acrylonitrile are notorious. Slight abrasions cause bruises in the fiber structure, resulting in warp streaks or other irregularities.

This problem reportedly has been solved by exposing the textiles before dyeing to an elevated temperature while they are kept under stress, ie, pressure or tension. The temperature may be between 300-500° F (250° F minimum). A customary household iron can be applied to press the goods while they are being heated at the above temperature, but other devices, such as heated rollers, may also be used. A pressure of 2 psi is the minimum, but 5 psi is preferred. As a rule, short contact is sufficient at higher temperatures; lower temperatures require longer contact. All traces of foreign matters must be removed before this pretreatment.

Example: A taffeta fabric composed of acrylonitrile homopolymer fibers was prescoured with a high alkylsulfate detergent to remove the preliminary finish, which was mostly a polyethylene ether of a higher alcohol. Then the goods were boiled off with an acetic acid solution of the same detergent. After one hour, the material was dried in a tumbler at 50° C and ironed with an ordinary household iron at 450° F. Upon being dyed with 3% Celanthrene Pure Blue BRS 200 for one hour at 90° C, a uniformly colored blue fabric resulted. A specimen dyed under otherwise equal conditions but with the heat-pressure treatment omitted showed variations in shade and warp streaks.

Among the references cited by the Patent Office:

French Pat 905,038 (I G Farben/1945) covers a method by which acrylonitrile-vinyl copolymer fibers are subjected to a treatment with dilute acids or alkalis at elevated temperatures to increase dye affinity.

BLEACHING POLYACRYLONITRILE FIBERS———Treatment with Dilute Acids B,1

USPat 2,751,277 (Eastman Kodak Co——Coover Jr, et al——June 19, 1956)

Acrylonitrile homo- or copolymer fibers generally exhibit a slight yellow or tan color that cannot be removed by chlorine, peroxide or other standard bleaching methods. Some of the usual bleaching agents are known to degrade the fibers without improving their whiteness.

It has been discovered, surprisingly, that a *simple washing process* with dilute acids has the effect of readily bleaching these fibers. Increased concentrations and temperatures will help to bleach more rapidly, but concentrations of inorganic acids must be limited somewhat in order to avoid hydrolyzation of the fibers. Acid concentrations generally should be between 1-10% and temperatures preferably in the range of 20-100° C. The treating time may be between one and three hours.

Among the inorganic acids, the oxygen-containing acids of phosphorus and also those of sulfur may be employed. A great number of organic acids are enumerated, such as lower aliphatic acids (eg, oxalic acid, especially protected by the claims), alkane sulfonic acids (ethane sulfonic acid), aromatic sulfonic acids and alkyl phosphoric or alkyl phosphorous acids. These acids are applied preferably in aqueous solutions.

Example: A skein of polyacrylonitrile-fiber yarns of slightly yellow shade was soaked in a 5% oxalic acid solution at 50° C for 3 hours. The fibers thereafter appeared free of color and did not show any loss in physical properties.

Other examples refer to treatments with 1% sulfuric acid at 60° C, 10% phosphorous acid at 30° C, 1% sulfuric acid at 45° C or 5% phosphoric acid in ethanol at 30° C.

Among the references cited by the Patent Office:

USPat 2,432,447 (Du Pont/1947) refers to the bleaching of polyacrylonitrile fiber with hydrogen peroxide and hypochlorous acid.

USPat 2,643,934 (Du Pont/1953)

covers a method which calls for stabilizing bleaching effects on polyacrylonitrile fibers first with chlorine, then impregnating with hypophosphorous acid and organic phosphites, and finally heating.

French Pat 913,939 (Rhodiaceta) calls for the bleaching of polyvinyl chloride fibers in a bath containing nitric and hydrochloric acids at room temperature.

DAYLIGHT FLUORESCENT DYEINGS ON NYLON——— Acid Dyes Used C.4,07

USPat 2,759,786 (Switzer Brothers——Switzer ——Aug 21, 1956)

The author refers to many details of USPat 2,606,809 (Switzer and Ward), which covers a special method of daylight fluorescent dyeing of cellulose acetate. It calls for immersing the goods in an aqueous solution of the fluorescent dye containing a mutual solvent (for dye and fabric) until the dye becomes solvated in the fabric. As soon as the desired depth of shade is attained, dyeing is interrupted ("the dyeing action is killed") by quickly flushing the material with cool water to prevent fixation of dye particles on the surface. This method, well known in practice, is termed "equilibrium dyeing" in contrast to normal exhaustion dyeing. It is characterized by fixation of the dye on or near the surface in non-solvated state.

This method, however, was found to

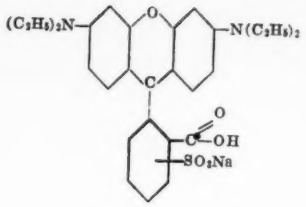


Figure 1
USP 2,759,786

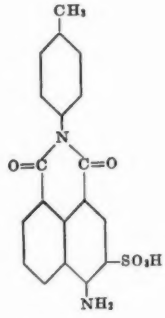


Figure 2
USP 2,759,786

give poor results in the dyeing of synthetic fibers, especially nylon. It has been observed that fluorescent dyeing of nylon can be effected better *by an exhaustive method* under certain conditions. Extremely strong organic acids (eg, formic acid) must be employed as solvating agents for the dyes, which are taken from the class of *acid fluorescent dyes*, such as sulfonated diethyl amino phenol phthalein (See Figure 1) or sulfonated amino naphthal totlyl imide (see Figure 2). Acid Rhodamine brands R, 2R, and 3R may also be used. The acid fluorescent dyes used in the current process give *poorer fluorescent effect* when applied in the *equilibrium method*, but reportedly brilliant effects and excellent wash- and lightfastness when used according to the exhaustive method.

The typical procedure is to dissolve the dye in an acid dyebath containing 5% of 85% formic acid. Nylon yarn is inserted in this bath and temperature is raised within thirty minutes to 82.5° C. Dyeing is continued at this temperature until no more dyestuff is adsorbed.

According to the examples, the application of several dyes in one bath must be avoided. However, overdyeing on one of the acid fluorescent dyeings with another of the same group in a subsequent bath, or with a basic fluorescent dye, or with a nonfluorescent dye, such as Xylene Milling Green (*CI* 735), reportedly gives good results.

Reference cited by the Patent Office:

USPat 1,796,011 (Gen Aniline/ 1931) describes a class of fluorescent wool dyes derived from naphthalic acid anhydride.

Abstracts

Dyeing Acrilan Jersey

Anon, *Man-Made Textiles* **33**, 69-70, November, 1956.

Acrilan, Chemstrand's acrylic fiber, has gained popularity in the field of jersey knitwear, because of its lofty hand and because all shades from pastels to the heaviest browns, navy blues and blacks are obtained by simple methods at low cost.

Dyeing is best carried out in a closed beck. In open machines there is too much variation in temperature between the outside and center, resulting in shade variations. Instructions for loading the becks are given.

Dyes are chosen from the following classes: disperse, basic, acid premetallized and chrome dyes and leuco vat esters. Acid premetallized and chrome dyes are used for the heavy shades. The author recommends that they be neutralized with bicarbonate after dyeing, to ensure maximum pickup of softeners in finishing.

Vat esters have good tinctorial value on Acrilan and are employed where high lightfastness is required.

Disperse dyes are easy to apply. If the water is alkaline, a small amount of acetic acid or ammonium acetate should be added to the dyebath.

Basic dyes exhaust uniformly on Acrilan. They are applied with ammonium acetate and a dyeing assistant (eg, Igepon T Gel).

In all dyeing operations it is important to raise the temperature very slowly, especially between 160° and 205°F. Also, the author stresses the importance of letting the dyebath cool slowly to 160° after dyeing, to avoid the formation of "shadow marks". Cold water must not be run on the hot fabric.

Bleaching of Acrilan, if required for very light shades, is done with Textone. Full instructions are given for this operation. To obtain the best whites, drying should be kept below 170°F.—WHC

The Compressive Shrinkage of Fabrics

Dorset, B C M, *Textile Mfr* **82**, 580-3, November, 1956

Compressive methods of fabric shrinkage have been developed mainly and perhaps solely for the purpose of closing-up fabrics so that in subsequent washing they will have no appreciable tendency to shrink.

At first the main object was to make unshrinkable fabrics for men's shirts. With the perfection of the "felt blanket" method by Cluett, Peabody & Co. the process became applicable to a wide variety of fabrics.

The author explains in detail the shrinkage that takes place in a fabric composed of hydrophilic fibers (eg, cotton or rayon) when subjected to a treatment of wetting and drying. He points out that if it is desired to give a fabric resistance to shrinkage in washing, the first thing to do is to wash a sample of the fabric

(Concluded on page 312)

News of the Trade

Koppers Plans to Increase Scope of Dye Business

Koppers Company, Inc, recently announced plans for increasing the scope of its dye business, which has been conducted by its wholly owned subsidiary, American Aniline Products, Inc.

Fred C Foy, Koppers president, said that the program involves integration of American Aniline with the Chemical Division of Koppers; the building of a new laboratory at Lock Haven, Pa for the development of new dyes and chemicals; and improvement of its sales, warehousing and service laboratory facilities in its Eastern and Midwestern sales districts.

The integration program became effective on March 31, at which time American Aniline ceased to be a Koppers subsidiary. It will henceforth be known as American Aniline Products, a unit of Koppers Company Inc. As in the past, it comes under the jurisdiction of the Koppers' Chemical Division.

Laboratory facilities to be added at the Lock Haven plant under the program will be housed in a new building, 100 feet long by 62 feet wide. It will house laboratory-scale mills for the grinding of pastes, and a small glass fractionating unit as well as all existing laboratory equipment now at the plant.

Mr Foy said that work in the new development laboratory will be aimed at producing new dyes and chemicals and their application in the textile, metal, oil and other fields. Approximately ten persons will be added to the present development staff.

Also under the program, headquarters of American Aniline, which have been in New York, will be moved to Pittsburgh. Within a few months Eastern district sales headquarters which have been in Hawthorne, NJ, will be moved to a new building now under construction at Paterson, NJ. This building will at the same time have warehouse and service laboratory facilities.

Chicago offices of American Aniline will be moved within a few months to a new combination office-warehouse-laboratory building, which is under construction and which will be leased by the Company.

Personnel changes as the result of the integration of American Aniline with Koppers Chemical Division are few. Operations of the American Aniline unit continue under T C Keeling, Jr, assistant vice president in Koppers Chemical Division, who has had this responsibility since Koppers purchased the Company two years ago.

George Armour, who has been president of American Aniline, remains with Koppers as a consultant. Talfryn James, who has been a vice president of American Aniline, has been named assistant vice president in Koppers Chemical Division with headquarters at the Lock Haven, Pa, plant. Administration of that plant will remain substantially the same as in the past.

Executive personnel which has been at the New York headquarters will be transferred to Pittsburgh.

7th National Materials Handling Exposition

The seventh National Materials Handling Exposition will be held April 29-May 3 at Convention Hall, Philadelphia, Pa., marking the show's first return to the East since 1953.

The show reportedly will be the broadest in scope of any show ever staged in the field. On display will be some 6,000 pieces of equipment of more than 100 basic types.

With the show the American Material Handling Society will conduct a 3-day conference to be addressed by 32 speakers of outstanding reputation.

New Dexter Addition to Manufacture Thermosetting Resins

Acquisition of a two-story stone building for the manufacture of thermosetting resins for the textile industry has been announced by Dexter Chemical Corp. The property, facing on Whittier St, Bronx, NY, adjoins Dexter's production and office facilities at 819-45 Edgewater Road.

A new boiler-house with a high-pressure steam system has been completed and storage tanks for raw materials set up. Glass-lined Pfaudler reactors, condensers and vacuum equipment for resin production is being installed.

The new plant will operate as an independent unit, even to its own fully-equipped control laboratory. It is anticipated that production will start by Sept 1.

Geigy Affiliate Buys Aula Chemicals, Inc

According to an announcement made April 3 by W F Zipse, president of Geigy Chemical Corporation, Aula Chemicals, Inc, a manufacturer of pigment colors for textile printing and dyeing with its office and plant in Elizabeth, NJ, has been purchased by a new corporation with the same name. The new corporation is affiliated with Geigy, and its president is Harry C Spatz, who is also president of Geigy Dyestuffs, a division of Geigy.

Mr Zipse stated that Geigy plans to utilize the Aula manufacturing facilities to add a line of pigment printing and dyeing colors to the established Geigy lines of azo and vat dyes.

Aula's operations at Elizabeth will be continued, under the general supervision of Philip R Gelzer, formerly of the Geigy Dyestuffs sales staff.

The president of the concern which was sold was Laszlo Auer, and the vice-president was Leslie L Balassa. Both men are vice-presidents of the new corporation. Dr Auer will be in charge of new developments and research, and Dr Balassa will be responsible for manufacture and technical service.

Sales of pigment printing colors produced by the new corporation will be under the direction of the president, Mr Spatz. Geigy Dyestuffs will add a pigment color department to its own sales staff, and William Hutz, who was a sales representative for Aula, has joined Geigy to be part of this new department.

Aula will continue to sell its line of Aulabrite colors. Pigment colors sold by Geigy will be under the Geigy trademarks Tinobrite and Tinolite.

Verona to Distribute Pharmols; Pharmasols

Pharma Chemical Corp has announced that, effective May 1st, Verona Dyestuffs will be the exclusive representative for their Pharmol and Pharmasol products, replacing Carbic Color & Chemical Co, Inc, as their sole agents for this line of dyes.

All other types of colors made by Pharma will continue to be distributed through Carbic.

New Wyandotte Plant to Make Nonionics

Construction of a large capacity multi-purpose plant at Wyandotte, Mich, for the output of newly developed products has been announced by Wyandotte Chemicals Corporation's Frank B Wolcott, vice president of the corporation and general manager of the Research and Engineering Division.

The new plant, to be known as the oxide products plant, reportedly will be capable of producing millions of pounds of chemicals annually. Scheduled for completion late this year, it is designed for future expansion. The multi-purpose plant will be capable of increasing output of Pluronic and Tetronic polyols, polyethers which are widely used nonionic surfactants and which only recently were announced as important intermediates in the rapidly expanding polyurethane foam plastics market.

Cowan Cites Industry's Response to Pollution Abatement

Belief that industry is willing to do all it can within reasonable and practical limits to solve water conservation problems was voiced recently by J C Cowan, Jr, vice chairman of Burlington Industries, at the Sixth Southern Municipal and Industrial Waste Conference.

Using as his theme, "Industry's Response to Pollution Abatement," Cowan addressed a banquet session of the conference in the ballroom of the North Carolina State College Union Building.

J H Lampe, dean of engineering at State College, presided over the session, which was attended by approximately 300 delegates from six Southern states.

The textile executive, saying that stream pollution headaches have become a part of the cost of a changing South, suggested that the value of industry to states and communities be weighed in determining realistic waste treatment measures.

Pointing to the research, technical skills and expenditures of money being brought to bear on water conservation and stream pollution, Cowan said that municipal and industrial waste problems vary from community to community and from plant to plant.

Urging careful study of each individual situation, in the search for satisfactory and practical solutions, he said that progress is being made through cooperative efforts of the state, municipalities, and industry.

Artist's conception of Kelco's New Research Laboratory at San Diego, Calif.

Kelco Building ¼ Million Research Lab

Kelco Co, producers of algin products widely used as thickening, suspending, stabilizing, emulsifying, film-forming and gel-producing agents has begun construction of a new $250,000 research laboratory in Research Park, San Diego, Calif.

"Primary purpose of these new research facilities," said Donald E Clark, president of the Kelco Company, "is to provide advanced technical service in the solution of the product and processing problems of our customers and to continue our intensive research in the chemistry of algin and its derivatives, as well as on promising new market developments."

48th Annual Meeting, AOCS

April 29 will mark the opening of the 48th annual meeting of the American Oil Chemists' Society at the Roosevelt Hotel, New Orleans, La, at which 60 papers will be presented over a three-day period in concurrent sessions. R M Persell and R T O'Connor of the Southern Regional Research Laboratory are general chairman and program chairman, respectively.

Following a Monday morning session devoted to the annual reports of officers and committee chairmen, the technical program will start in the afternoon.

There will also be the traditional social events during the meeting, including the past presidents' dinner Monday, the golf tournament and banquet Tuesday, and the Awards luncheon Wednesday.

CORRECTION

YOUR attention is called to an error which appeared on page 36A of the March 11th issue.

The advertisement of Otto B May, Inc, Newark, NJ, listed as selling agents Carbic-Moss Corporation. This should have read: Carbic Color & Chemical Co, Inc.

Carpet Wool Trade Meets With Testing Specialists

Over 100 representatives of the Boston, Philadelphia and New York carpet trades met recently to discuss technical aspects of wool sampling and testing with officials of United States Testing Company, Inc, Hoboken, N J.

This meeting, held at US Testing's Philadelphia branch, was the second in a series planned to outline recent advances in wool testing and to provide for future needs of the carpet wool industry. Of primary interest in the session was a discussion of techniques for measuring those factors which make up the "character" of wool, such as resiliency, brittleness, kempiness, color and strength. The wool representatives also discussed the need for scoured samples and the best way of drawing such samples.

'57 Scholarships Still Available to New Students at NC State

North Carolina State College officials have announced that applications for scholarships may still be submitted by students who plan to enter the college in the fall of 1957 to study in the college's School of Textiles.

The Leon Lowenstein Foundation of New York City offers two four-year scholarships, each in the amount of $500.00 per year.

The Albany Felt Company of Albany, N Y, has established a $500 a year scholarship in textiles, which may be renewed from year to year through a four-year course.

Lyle B Rogers, acting director of student personnel at State College, said high school seniors interested in studying textiles at State College who have good high school records and who are in need of financial help to attend college are encouraged to apply at once.

Applicants may write the Financial Aid Office, 206 Holladay Hall, North Carolina State College, Raleigh.

Arnold, Hoffman Salutes ICI for Five Major Dyestuff Discoveries

Five of the major dyestuff discoveries introduced to the textile world since 1920 are attributable directly to the laboratories of Imperial Chemical Industries Limited or its immediate predecessors, according to Arnold, Hoffman & Co, Inc, ICI affiliate.

As listed by Arnold, Hoffman, the roll of credits includes Caledon Jade Green, "the first and still the fastest green vat dye"; Duranol dyestuffs, "the first to dye acetate rayon satisfactorily"; Monastral Fast Blue B, "the epoch-making phthalocyanine pigment"; Alcian Blue 8G, "the first phthalocyanine dyestuff to give dyeings and prints of pigment-standard fastness"; and Procions, "the important new reactive dyes that form a permanent chemical bond with cellulose during dyeing and printing."

Alcian Blue 8G has been an important factor in the Arnold, Hoffman range of specialties since it was introduced by the company to the United States market six years ago.

Presently, the new Procions are manufactured by ICI and are available to dyers and printers in the United States through Arnold, Hoffman. Facilities at the company's plant in Dighton, Mass, are being expanded and before the end of the year Procions will be on the market as products manufactured domestically by Arnold, Hoffman & Company, Inc.

34th Annual Meeting, AIC

The thirty-fourth annual meeting of the American Institute of Chemists, Inc will be held at the Sheraton-Mayflower Hotel, Akron, O, from May 22 through May 24.

Theme of this year's national meeting will be: "The Chemist and Management Appraise Each Other".

All discussions and papers will follow a general theme of how a chemist should function in America's industrial world. A great deal of the material will be concerned with the chemists' individual problems, such as job success, self-appraisal, compensation, self-improvement and advancement.

Highlight of the program will be the Gold Medal Banquet on May 23. AIC president J H Nair will be toastmaster. Roy C Newton, vice president of Swift and Co, has been selected unanimously to receive the 1957 Gold Medal. The gold medal will be presented by Lincoln T Work, New York City chemical consultant and chairman of the Institute's Committee on Medal Award.

Old Slater Mill Museum Opens

The Old Slater Mill Museum in Pawtucket, R I, has reopened for the Summer season.

The Museum, located in the original building in which Samuel Slater established the first successful cotton manufacturing plant recognized as the "Cradle of the Textile Industry" in the United States, is devoted to the history of the textile industry.

Museum hours are Tuesday through Saturday from 10 am to 5 pm and on Sundays from 2 to 5 pm. The Museum is closed on Mondays. A nominal admission fee is charged for the purpose of further developing the Museum into one of the most complete of its kind possible.

A special feature of the Mill's reopening is a month-long display of scale models of Leonardo da Vinci, 16th century Italian inventor and artist, on loan from the Fine Arts Department of International Business Machines Corporation.

Of interest to visitors will be the Museum building itself, with its timbers and beams hand hewn by 18th century carpenters and other colonial architectural features.

46th Paris International Fair

Some 4,000,000 businessmen and visitors from all parts of the world are expected to view the products of over 13,000 exhibitors from 39 countries at the 46th annual Paris International Trade Fair, May 25 to June 10.

The 60 separate classifications of exhibits will range from textiles to heavy duty construction equipment.

The United States will again be represented this year by the official exhibit in the permanent U S Pavilion, the first ever built by the U S Government for a foreign trade fair, and by some 200 American firms with individual displays.

A six-man U S Trade Mission, headed by Marshall M Smith, deputy assistant secretary of commerce for international affairs, will be on hand to counsel foreign businessmen on marketing and distributing facilities in the U S. The trade team includes four private American businessmen.

Last year, the U S Trade Mission established 6,461 contacts, while 278 foreign businessmen discussed their trade problems with individual members of the Mission.

American businessmen can obtain a guest card to the Paris Fair from the French Chamber of Commerce of the U S, Inc, 250 West 57th Street, New York 19, NY.

Dow Corning Planning 2nd Silicone Promotion

Complete plans for a second nationwide promotion of Syl-mer silicone finish for textiles, and Sylflex, silicone for leather, have been announced by Dow Corning Corporation.

The forthcoming program is timed to extend from September through December, the top months of the Fall 1957 retail selling season. According to Dow Corning, the program will be even larger than the company's Fall '56 drive, which was called the record expenditure for textile finishes by a chemical firm to support a retail promotion.

Special emphasis will be placed on the latest fashions in apparel, upholstery and decorative fabrics featuring Syl-mer and shoes made of Sylflex tanned leather. Mills, cutters, tanners, shoe manufacturers and retailers will tie into the program with advertising and merchandising support.

The entire program has been outlined in detail by Dow Corning in a 28-page booklet which will be used by participating manufacturers' sales staffs.

The scope of the Fall promotion will also be broadened as a result of recent licensing arrangements concluded between Dow Corning and several other leading chemical companies who manufacture silicone emulsions made with Dow Corning's Syl-mer, a silicone-based finish that renders cotton, wool and synthetic fabrics resistant to water-borne stains and wrinkles. By the terms of the agreements, these companies can use the Syl-mer name and trademark on their finishes. Their mill and finisher customers can also supply the Syl-mer mark to finished merchandise cut from the processed fabrics. Arkansas Chemical Company, American Cyanamid Company and Warwick Chemical Company are among these licensees.

In the apparel field alone, this development will approximately triple the number of Syl-mer tags used, according to Dow Corning.

Commercial production of the "Syl-mer" finish began over five years ago. It is based on one of a family of silicones developed about 1942 from quartz rock, a material that resists moisture, heat and cold—the most common wrinkle-causing elements. When properly applied, the "Syl-mer" finish is said to allow air to pass through the fabric, while the invisible film of silicone that forms around each fiber remains durably water repellent and stain resistant, even after repeated drycleaning or laundering.

• NAMES IN THE NEWS •

Swiney

Dewing

Lord

Walker

James W Swiney, formerly associated with Fulton Bag & Cotton Mills, Atlanta, Ga, will become actively engaged in executive administration of Bryant Finishing Co, Quidnick, RI, as its vice president.

Mr Swiney is well known in the dyeing and finishing field, having recently resigned as chairman of the Southeastern Section of AATCC. As vice president in charge of operations, Mr Swiney will be in complete charge of the manufacturing policies of Bryant Finishing Company and serve as general manager of Millburn Mills and George E Mousley Novelty Company. The company plans to add additional and more varied finishing equipment with the expectation of achieving greater production.

John Dennigan, long associated with the Bryant Finishing, will assume the sales direction duties, and will operate from both the New York and Quidnick offices.

William Max Fowler, former vice president and sales manager of the Palatine Dyeing Co, St Johnsville, N Y, has been elected president and treasurer of the newly-formed Adirondack Finishing Corp, Johnstown, N Y.

The new company, according to Mr Fowler, has acquired through a long-term lease the Johnstown plant and equipment of the Triangle Processing Corp. Adirondack, he said, will maintain and operate a complete dyeing, finishing and processing business for all types of synthetic fibers.

Other officers of the new company are: Mr Fowler's wife, Elizabeth, secretary; and his sister, **Lorraine Fowler,** vice president.

Thomas L Lesslie has been promoted to the position of chief research chemist for Southern Dyestuff Corp, Charlotte, NC.

Dr Lesslie joined Sodyeco in 1956, after approximately six years with Monsanto Chemical Co as research chemist and group leader.

Brouillard

Wich

Warren M Dewing has been appointed New England Branch Manager of General Aniline & Film Corporation for dyestuff sales. Mr Dewing has been assistant branch manager since 1953 and for four years previously had served as branch manager in Boston, Mass. In his new position he will maintain his offices at the General Aniline Building, 85 Tockwotton Street, Providence, R. I.

Mr Dewing succeeds **Wilford A Lord,** who recently retired after fifty years of continuous employment in the dyestuff field. He first started in the business as an office boy at the age of fifteen with the Continental Color & Chemical Company in his native city of Providence.

Robert E Brouillard has been named assistant manager of GAF's Pigment Division and **Emil A Wich** has been named manager of the Pigment Technical Department of the Dyestuff and Chemical Division.

From 1956 to the present, Dr Brouillard has been assistant manager of research and development at the Company's Linden, N J, plant.

Mr Wich has been on General Aniline's technical staff since 1939, specializing in pigment applications.

Milton Harris, founder of Harris Research Laboratories, Inc, recently acquired by The Gillete Co, was elected a vice president of the company at a recent annual meeting of shareholders in Boston.

Dr Harris will continue as director of research for Gillete, dividing his time between Boston and Washington.

Howard R Walker, formerly assistant technical director for the dyestuff division of Sandoz, Inc, has joined The Dow Chemical Company's recently formed textile fibers department to head up the dyeing and finishing group.

Prior to his work with Sandoz, Walker was chief chemist of quality control with Riegel Textile Corporation and had also worked for Deering Milliken and United Merchants in South Carolina.

Other changes in Dow's textile fibers department announced recently include the promotion of **Ferrell G Kent** to the position of supervisor of quality measurement; **Robert C Cottrell** and **Phillip A Gruber** to development supervisor posts, and **Charles M Alberto** and **Harry N Woessner** to assistant development supervisor positions. All five men have been with Dow's textile group for several years.

Dow intends to begin commercial production of Zefran, a nitrile alloy synthetic fiber, next year at its Lee Hall, Virginia, plant. Construction of the plant began in January.

Appointment of **Wilbur H Brumfield** to the position of assistant to the president of Solvay Process Division, Allied Chemical & Dye Corporation, has been announced.

Mr Brumfield has been a Solvay employee since 1934. Since September 1955, he has served as assistant to the director of operations at Solvay's Syracuse plant. In his new post, Mr Brumfield will make his headquarters at Solvay's Executive Office in New York City.

Maison G deNavarre, founding member of the Society of Cosmetic Chemists and a member of AATCC, has been awarded honorary membership in the Comitato Italiano di Estetica e Cosmetologia.

The Comitato Italiano honored Mr deNavarre for his contributions to cosmetic science.

Browne

Alexander

Colin L Browne, a textile development chemist, and **James D Alexander,** a physicist, have joined the staff of Celanese Corporation of America's textile development laboratories at Charlotte, N C. Both are assigned to the Applications and Product Development Department staff.

Dr Browne was formerly associated with Rohm & Haas Co, Philadelphia, Pa.

Prior to joining Celanese, Dr Alexander was associated with the Los Alamos Scientific Laboratory, Los Alamos, NM.

Chester A Amick of the Bound Brook Laboratories of the Research Division, American Cyanamid Company, is one of three chemists who have been honored as "Chemist of the Year" by the New Jersey Chapter of the American Institute of Chemists for their work in behalf of New Jersey's six state teachers' colleges.

Mr Amick was chairman of a three-man committee of the Institute, whose public education program for better facilities for training science teachers played a major part in inducing the electorate to approve a bond issue of $15 million which has been used to construct some 21 new units at the six teachers' colleges including the new science building at Montclair State Teachers College.

Other members of the committee were **H W Mackinney** of the Bakelite Company at Bloomfield, and **Leon Joslin** of Standard Oil Development Company in Linden, NJ.

The award will be presented at the dinner at the Newark Athletic Club on May 3, 1957.

Mr Amick is a member of the Curriculum Committee of the New Jersey Teachers' Colleges and was chairman of the committee which helped to equip a new Chemistry Building at Rutgers University. Mr Amick has devoted himself to textile dyeing and printing. He holds 28 US patents in the textile dyeing and finishing field and more than 50 foreign patents.

The appointment of **Carlyle E Miller** as general sales manager of the Toiletries and Dyestuffs division of Park & Tilford has been announced.

Kenneth R Fox, associate director of Fabric Research Laboratories, Inc, Dedham, Mass, left last month on a business trip to Europe.

The main objective of Dr Fox's European trip was to discuss foreign licensing and manufacturing arrangements for the Compactor machine. The Compactor is a preshrinking machine developed by Fabric Research Laboratories and built commercially in the United States by Riggs & Lombard, Inc, Lowell, Mass.

Dr Fox visited textile firms in England, France, and West Germany.

McIlwain

E T McIlwain has been appointed Suntone service manager and sales representative for the Warwick Chemical Division of Sun Chemical Corporation.

Mr McIlwain will be responsible for technical service on Suntone pigment printing colors in Warwick's southern territory and serve as sales representative in the South Carolina area. He will be headquartered at Warwick's southern plant in Rock Hill, SC.

Before joining Sun Chemical he was employed at the Fulton Bag & Cotton Mills, and Interchemical Corporation.

Ritz

James W Ritz has been promoted to the position of assistant sales manager of the Organic Chemical Sales department of Emery Industries, Inc. He was formerly Eastern district manager of Emery's Chemical Sales Department.

He succeeds **R T Hull,** recently, named vice president and general manager of Emery's newly acquired Canadian subsidiary, Emery Industries (Canada) Ltd.

Glen Merrill Hearin has been named to the position of director of public relations for the National Institute of Rug Cleaning. He succeeds **Lawrence S Jeppson,** who is establishing his own advertising and public relations agency after four years with the Institute.

Mr Hearin was employed as telegraph editor of the *Washington Post and Times Herald* when he was named to his present post with the National Institute of Rug Cleaning.

Becco Chemical Division, Food Machinery and Chemical Corp, Buffalo, NY, has announced several promotions within its ranks.

Norbert Weinberg, a member of the Textile Research and Development Group since 1953, has been named assistant to the manager of textile research and development, **Bernard K Easton.**

Ralph J Gall, formerly group leader, organic research and development, has been named assistant manager of organic research and development.

Samuel S Naistat, formerly assistant to the manager of inorganic research and development, has been named manager of inorganic and physical-chemical research and development, and **Joseph Bomstein** has been promoted to assistant manager. Mr Bomstein, who joined Becco in 1954 as a research chemist, will also retain his present duties as supervisor of the analytical section of Becco's research and development department.

John R Hopkins, formerly assistant manager of Becco's southern territory, has been promoted to technical assistant to the sales manager.

Desmond M C Reilly has been named manager of technical information for FMC's recently formed Organic Chemicals Div. He will be located at Division headquarters in New York, and will be responsible for the preparation of technical literature on the organic chemicals, plastics, plasticizers and pharmaceutical intermediates made by the Division and also for the Division's advertising program. For the past four years, Mr Reilly has been responsible for technical and promotional literature for the Westvaco Mineral Products and Westvaco Chlor-alkali Divisions of FMC.

Hopkins

Reilly

Dye Nets of Dacron Called 'Best on Market'

Replacement requirements for dye nets have been reduced 50 percent since adoption of nets of Dacron polyester fiber, according to Merlin, Inc, North Bergen, NJ. The firm is a dyer for such knit goods as sweaters, gloves, socks, dresses, suits, and cloth of all synthetic fibers.

Leonard J Ehrlich, president of Merlin, Inc, has stated, "We have been using nets of Dacron since February, 1955, and think they are the best on the market. They are far more manageable than natural fibers."

The Merlin Company reportedly has found dye nets of Dacron last far longer than nets of natural fibers because of greater resistance to Textone bleaches as well as to abrasion, pin damage, and snagging in normal handling operations.

Heat resistance has also been a factor in favor of Dacron. In some of the company's operations, the dye nets are said to have been subjected to dry heat as high as 200° F. They have shown no appreciable strength loss over long periods.

The company uses a "progression" method for dye nets. The new nets are used first for white work, during which they are subjected to Textone bleaches. They are then used for dyeing in light shades and finally with dark shades, where they remain until no longer useful.

Use of nets of Dacron polyester fiber by Merlin followed extensive testing in co-operation with Jack Rachleff, vice president of Fablok Mills, of Irvington, NJ. Merlin purchased a large inventory of nets of Dacron initially but has to replace only about 25 dozen per quarter. About 60 percent of the original nets are still in use.

Crestex Formula DPA

Crest Chemical Corporation, 225 Emmet St, Newark, NJ, has announced the development of Crestex Formula DPA, an antifoaming agent claimed to eliminate foam with exceptional rapidity. This product, available in convenient emulsion form, is said to show the following outstanding features:

1) Extremely effective—a little bit does the job.

2) Wide application—used whereever there is foam in aqueous medium.

3) Stock solutions can be made up for economical use.

4) Convenient to handle.

5) No evaporation which leads to refoaming.

6) Can be used over the entire pH range.

Crestex Formula DPA, it is claimed, in very small quantities completely eliminates foam in such operations as dyeing, scouring, kier boiling, package yarn dyeing, printing, and finishing.

Samples, data sheets and application formulas are available from Crest Chemical upon inquiry.

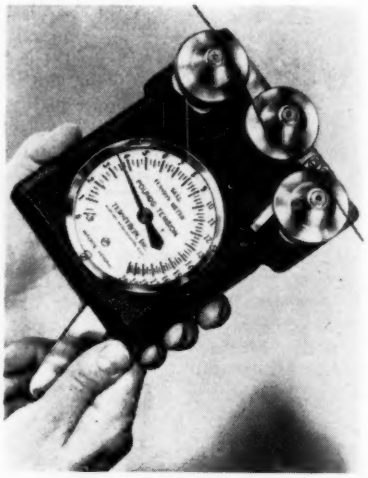
20-lb Tension Meter

A new lightweight tension meter for checking tensions during the processing of yarns, cords, and wires has been announced by Tensitron, Inc, Harvard, Mass. This new instrument reportedly has a range of one to twenty pounds, with great resolution at the low tension end.

It features a lever-inserting mechanism whereby two outer rollers are lowered or raised simultaneously. The controlling lever is at the side of the instrument away from the moving material, thus protecting the operator's hands, and the moving material is kept away from the observer.

The rollers are tapered, thus widening the opening where the material to be tested is placed, and at the same time guiding the material into test position. Wide flanges at the bottom of the low-inertia rollers hold the material in place while tension is read as the material travels at production speed.

This completes, for the present, the line of Saxl Tension Meters which now covers a range from 25 grams through 20 lbs.



20-lb Saxl Tension Meter

V & S Flock Beamer FO-2

The Vollenweider & Saladin Flock Beamer FO-2 is now being introduced in the United States by Cosa Corporation, 405 Lexington Ave, New York 17, NY. The combined features of this flock beamer are said to provide both increased production and a finer quality of flocked material.

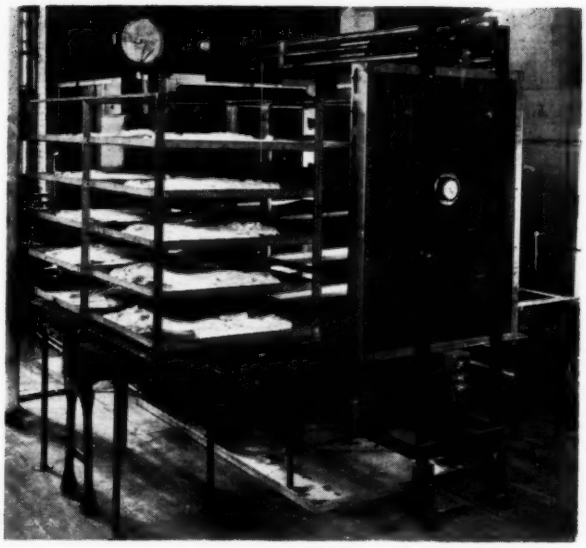
Electrostatic flocking and electrostatic flock recovery result in an upright pile of uniform density, clear contours and very good definition of design, it is claimed. This beamer operates on AC and reportedly will perform without trouble under humid conditions—thus cutting down costly delays or shut-downs from variable plant humidity. It will flock all types of textile fabrics, paper, leather, lastex and plastics.

The electro-static field is created by connecting one pole of the flock beamer to a high-tension electrostat and the other pole to the counter-potential—a copper plate beneath the fabric. Voltage of the electrostat potential can be regulated to obtain a maximum of 45,000 volts and .2 amps.

The beamer itself is divided into an upper and lower compartment. An agitator in the upper compartment (flock reservoir) circulates the flock throughout the hopper and prevents balling up. A mechanical controlling device, fed by this agitator, supplies flock to the lower compartment where a second agitator feeds it onto a wire screen. Since the screen is connected to the electrostat, it charges the flock as it passes onto the adhesive-coated material. When this flock lands on an area not coated with adhesive, or on an already flocked area, it loses its charge to the grounded fabric. The screen then automatically recharges the excess flock and causes its return to the container. It is claimed that, as a result of this recirculation, no excess flock can gather on top of previously flocked areas, and contours are given excellent definition.

When charged flock fiber is dispersed from the sieve onto the fabric it automatically assumes the magnetic properties of a north-south relationship. The polar attraction of the counter-potential will align the flock fiber perpendicularly to the path of the material—thereby providing an upright pile of uniform density.

Cosa Corporation will exhibit the V & S Flock Beamer FO-2 at the 43rd Knitting Arts Exhibition next week in Atlantic City, NJ.



New Turbo Sweater Setting Machine for Ban-Lon

Tray-type Sweater Setting Machine

A new tray-type sweater setting machine, designed especially for Ban-Lon, has been announced by Turbo Machine Company, Lansdale, Pa.

Turbo maintains that a final setting after knitting is essential for evenness and uniformity in the finished garment. In the new machine, alternating cycles of steam and vacuum at 265° F are closely controlled with electrical timers. There are two tray carriers, one on each side of the setting cabinet. When a setting cycle is completed, the cabinet door opens and one carrier moves out while the other moves in. The operator's only function is to load the carriers.

Each carrier holds 10 dozen sweaters. A typical setting cycle is 12 minutes. Based on 12-minute cycle, it is claimed that production up to 50 dozen sweaters per hour can be achieved.

Ponsol Navy Blue 2D Double Paste; Ponsol Red Brown N Paste

Production of two new anthraquinone vat dyes, Ponsol Navy Blue 2B Double Paste and Ponsol Red Brown N Paste, was announced recently by Du Pont's Dyes and Chemicals Division.

Ponsol Navy Blue 2B Double Paste is particularly recommended by Du Pont for use in the production of full navies on cotton or rayon. It is said to be of particular value when used for dyeing dress goods, shirtings, uniform fabrics and other materials that require a dye with good fastness to light, chlorine, washing and other color-destroying influences. Excellent results reportedly are obtained when applied by the Du Pont pad-steam continuous dyeing process to cotton or rayon piece goods.

Ponsol Red Brown N Paste is said to produce economical red-brown shades on cotton and rayon. It is a good base for many brown shades and is a suitable shading component. It reportedly may be used for dyeing uniform fabrics, shirtings and other articles that require good fastness to light, washing, pressing and drycleaning. This dye does not stain adjacent nylon during laundering, it is claimed. It reportedly can be applied with excellent results to piece goods, particularly by the Du Pont pad-steam continuous dyeing process. Ponsol Red Brown N Paste is recommended by Du Pont for skein and warp dyeing of cotton yarns.

USDA Seeks Practical Commercial Method to Give Crease-Holding Finish to Cotton

Methods of applying a crease-retaining finish to cotton garments with standard drycleaning equipment will be sought under a research contract recently negotiated by the US Department of Agriculture with the National Institute of Drycleaning, Inc, Silver Spring, Md.

The treatment was brought to its present stage of development as the result of cooperative research by the Department's Agricultural Research Service and such outside agencies as the National Cotton Council of America, the National Institute of Drycleaning, and certain resin manufacturers.

Today's cottons with wrinkle-resistant finishes are well suited for simple garments but are not fully satisfactory for tailored ones. The finishes are always applied to the cottons as piece goods, before they are made up into clothing. The treated fabrics resist both undesirable wrinkles and desirable pressed-in creases, making it difficult or impossible to crease or pleat the garments or to sew flat seams or pockets on them.

The treatment now under development, which involves application of a resin finish to cottons, gives them crease-holding as well as wrinkle-resistant properties. The resin formulation used is a combination of a reactive-type resin (dimethylol cyclic ethylene urea) and acrylate thermoplast, two catalysts, a silicone emulsion, a softening agent, and water. The finish is not applied until after the garments to be treated have been made. Thus seams and pockets can be ironed flat, and pleats and creases can be permanently set where they are needed.

This resin treatment, which USDA researchers hope will prove practical for commercial application, has already been tested experimentally at the Department's New Orleans laboratory. The garment to be treated is first wet with a solution of the resin and other chemicals, and is then partially dried. The final step is curing, or setting the fabric into permanent creases or pleats with a hot flatiron. Once curing is complete, further pressings will not set new pleats or remove the old ones.

In the laboratory tests, swatch samples of cotton were treated and cured with ironed-in creases. They were then machine washed, rinsed, and ironed flat. No effort was made to preserve the creases, yet after 12 launderings they remained crisp and sharp.

The resin treatment was effective on several types and weights of cotton fabric from delicate lawn to sturdy twill. Women's blouses and men's sports shirts and slacks retained creases after many launderings, needed little or no ironing, and were wrinkle-resistant during wearing. Treated garments were also found cooler and more comfortable to wear, because they needed no starch.

Although the new process looks very promising, further research is needed before it will be ready for commercial use. Under the contract with the National Drycleaning Institute, the Department hopes to perfect the method, using commercial drycleaning equipment to apply the resin and cure the finish. It is hoped that, in the future, drycleaners may be able to add permanent creases and wrinkle-resistance to cotton garments as easily as they now add water-repellence to raincoats.

Hartoresin S-50
Hartoset F-60
Softolene A

Hart Products Corp, 1440 Broadway, New York, has announced the addition of three new products to its line of thermosetting textile resins.

Hartoresin S-50 is offered as a high-solids, stabilized urea-formaldehyde resin syrup. It is claimed that Hartoresin S-50 is useful as a stiffening agent for nylon net materials and as a bodying resin for "wash-wear", schreinered, embossed, and glazed finishes on cottons. It is said to have higher storage and bath life than unstabilized urea resin syrups.

Hartoset F-60 is offered as a modified urea-formaldehyde resin for stiffening and flame-retardant finishes on nylon laces, nets and shoe-cloth. Hartoset F-60 is claimed to give excellent stiff finishes without increasing the flammability of the fabric. It is available as a high-solids syrup.

Softolene A is a synthetic wax emulsion for use as a softener in resin formulations for cotton stabilization. It is said to give an excellent hand and an improvement in the tear-strength of the resin-treated cotton.

Samples and suggested formulations with the above products are available from Hart Products on request.

Vulcanol Adhesive AL-1005

Culminating months of cooperative work with fiber manufacturers and carpet makers, a new latex splicing compound, Vulcanol adhesive, AL-1005, for joining carpet yarns made from nylon, acetate, Acrilan, viscose, cotton and wool has been announced by the Alco Oil and Chemical Corp, Philadelphia.

This latest addition to Alco's series of quick-setting adhesives is said to set uniformly and quickly, but not so rapidly as to interfere with the operator making a strong, well-formed yarn joint.

The new adhesive has been developed especially for use with the newer, non-absorbing synthetic fibers which, heretofore, have been difficult to splice because of their inability to destabilize adequately the older types of latex compounds by withdrawing water.

Splices made with the new adhesive reportedly need not be more than ⅜ of an inch in length nor of a diameter exceeding that of the yarn itself. Moreover, they are said to be strong enough to withstand the tensions of various winding, creeling, and tufting operations and sufficiently flexible to pass through the needle eye and over the hook at acute angles while the yarn, needles, and hooks are in motion.

Sold in two parts, the new Alco splicing compound is to be mixed just prior to use in a wet weight ratio of 84 parts of one component to 16 parts of the other. Under summertime mill temperatures, the mixed material reportedly is stable for about eight hours; consequently a quantity sufficient for one shift can be prepared at a time.

Artisil Direct Blue Green G
Lumicrease Bordeaux 3LR

A brighter blue green dyestuff for use on man-made fibers and a new, direct dyestuff suitable for automotive and decorative fabric applications have been announced by Sandoz, Inc.

Characterized by Sandoz as the brightest bluish green of all dispersed dyes, Artisil Direct Blue Green G is said to be suitable for dyeing of acetate, polyester, acrylic, and nylon fibers. It reportedly possesses a high degree of heat stability and is therefore being recommended by Sandoz for the dyeing of nylons and triacetates which will be heat treated.

Lumicrease Bordeaux 3LR reportedly possesses extremely good fastness to light, perspiration, and crocking. It is stated that wet fastness of the direct color is good, and when aftertreated with Cuprofix, Sandofix and/or resins, this color provides an even greater degree of wetfastness. It is said to give a perfect acetate reserve and to produce satisfactory unions on cotton/viscose blends.

Leaflets on both dyestuffs are available from all district sales offices of Sandoz, Inc.

Abstracts

(*concluded from page 304*)

under drastic conditions, comparable in effect to the amount of washing and drying which the fabric might experience during its normal useful life, and then to measure the shrinkage, and finally, to submit the bulk of the fabric to some form of finishing that will have the effect of closing-up the fabric threads to the same extent as the washed sample.

The manner in which this is accomplished by the Cluett, Peabody "felt blanket" process is described by the author. Quite recently a new development has been introduced which makes use of a rubber belt instead of the felt blanket. The new process, which is also described, is somewhat simpler than the older one, and is said to be particularly suitable for cotton poplin fabrics.

Still another fabric compacting machine, recently described by Hamburger and Fox, avoids the necessity of using either a blanket or a belt, and relies entirely on the use of rollers. The machine, which is described in detail by the author, has been used for compacting a wide range of fabrics, consisting entirely or of blends of such fibers as viscose rayon, acetate, Orlon, nylon, Dacron, and Dynel. Some of the advantages of this new compacting process are described. A useful feature of such compacting is that it can increase the thickness of a fabric without flattening it in any way.

There appear now to be three distinct types of machine for mechanically closing up the threads of a fabric.—WHC

Eastman's New 50 Yarn

Heape, J M and Norrell, R H, *Modern Textiles* **38**, 33-4, 81, February, 1957

Eastman's 50 yarn is an acetate yarn composed of hollow filaments with doughnut-shaped cross-sections. It has a relatively round, smooth surface. The result is an increase in luster and greater bulk, compared with regular Estron yarn. It also has slightly less stretch, somewhat more stiffness, equal or better abrasion resistance and tear strength and equal crease recovery, and is said to give a "fuller, more luxurious hand" to fabrics of the same construction. The "doughnut" shape of the cross-section is not affected by ironing.

With few exceptions, the new 50 yarn can be processed in the textile mill in the same manner as regular acetate.

The authors also refer briefly to Estron Crystal and Chromspun Crystal yarns, made by Eastman, which are acetate yarns with "novel" cross-sections. The flat filaments in these yarns are said to give a "decided optical effect of scintillation" not obtainable with regular acetate. They are recommended for dress goods.—WHC

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